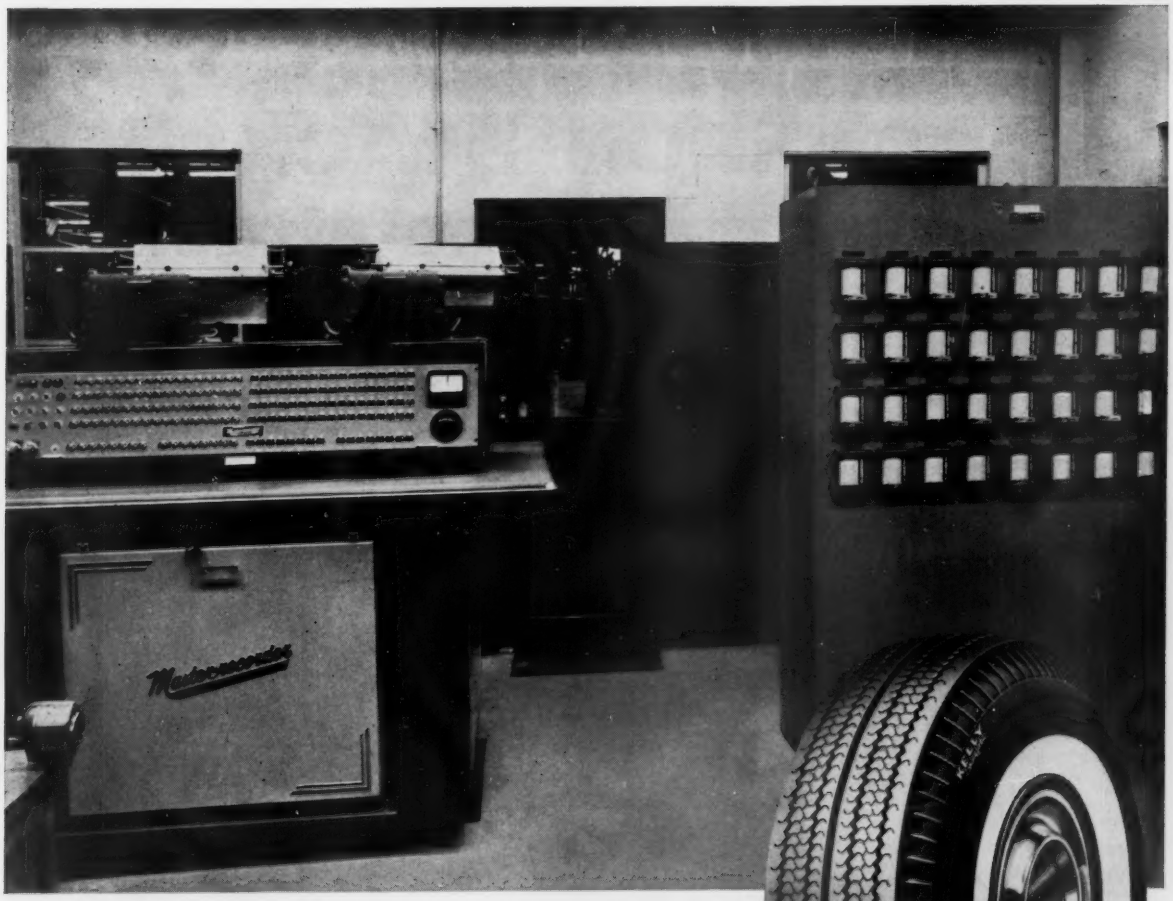

KELLY Springfield TIRES **BUILDS QUALITY...**

AND MAINTAINS IT WITH *Taylor* QUALITY CONTROL SYSTEM!

Pictured is the new Taylor Master-recorder* System, in use with McNeil Automatic Loading Bag-O-Matic presses at The Kelly-Springfield Tire Company's Cumberland, Md., plant.

The first of its kind to be used in the industry, the Master-recorder System helps insure uniform quality by detecting minute variations in the vulcanizing temperatures that might affect tire quality. It automatically checks each of 68 presses and 8 headers every six minutes. Should the temperature exceed or fall below that prescribed, an alarm is sounded and a signal light appears on the console, identifying the press or header. (See scanning and logging system at left of photograph). Off-normal conditions are typed in red on logging chart. The panel of Taylor TRANSET* miniature recorders on the right logs the actual bag pressure and cure cycle time. This provides a chart record of the curing cycle for the future reference of operators and quality control men.

With this centralized information system, rejects are kept to an absolute minimum and operator time is reduced Since any malfunction can be detected almost immediately, the maintenance problem is greatly simplified.

Call your Taylor Field Engineer for more information about this latest Taylor development. Or write Taylor Instrument Companies, Rochester, New York or Toronto, Ontario.

The Master-recorder System is a product of Taylor-Emmett Controls, Inc., a subsidiary of Taylor Instrument Companies.

*Trade-Mark

***Taylor Instruments* MEAN ACCURACY FIRST**

what type of CARBON BLACK helps fight ozone attack?

UOP 88® ANTIOZONANT

UOP 288® ANTIOZONANT

The SBR specimens below were exposed to ozone at 100° F, 20 percent elongation, 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.

the kind you choose can be a help or a hindrance . . .

Are you aware of the extent to which some carbon blacks adversely affect the protection afforded rubber products by antiozonants?

Some inactivate much of the antiozonant added for ozone protection. Others are more compatible with the antiozonant.

The two rubber test strips shown at right are clear evidence that carbon black plays an extremely important part in obtaining maximum service life of rubber compounded with antiozonants.

In formulating rubber compounds which must have high resistance to ozone, look to Universal for assistance. Special facilities and technical personnel are available to serve you. Write or telephone our Products Department.

(Left) Carbon black—EPC (easy processing channel), Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide, Hours to first crack—31 to 47.

(Right) Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide, No cracks in 239 hr.

UOP

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road,
Des Plaines, Illinois, U. S. A.

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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5107 Telegraph Road
Los Angeles 22, Calif.
Phone: Angelus 1-8136

PHIL GLANZER
223 Coldstream Ave.
Toronto 12, Ont., Canada
Phone: Hudson 7-2139

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* Appears every other month

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Highlights Sidelights *of the News . . .*

July, 1960

General Tire & Rubber Co. has won its suit for a patent on an oil-extended rubber process . . . The decision overruled the U.S. Patent Office Board of Appeals which had rejected the company's bid for a patent . . . Annual royalties under the patent, some predict, could run as high as $42 million a year (page 661).

United Carbon Co. has initiated a million dollar process equipment change-over in order to incorporate production of a series of new black masterbatch compounds which will provide faster tire production and improved road wear . . . The company has also announced a 50 million pound a year increase in capacity (page 660).

About $25 billion will be invested in chemical facilities by the Soviet Union during a five-year plan which will run through 1965 . . . About $12 billion of the total amount is earmarked for expansion in synthetic rubber, plastics and fibers (page 663).

Seiberling has acquired the tread rubber facilities of the Gutta Percha and Rubber Co., Ltd., Toronto, Ont., Canada . . . The company has also announced plans to organize a new U.S. subsidiary to make and sell a "direct line" tire at a low delivered price (page 667).

The Canadian Government has begun an inquiry into the export difficulties which the Polymer Corp. has been running into . . . The company is producing a good deal more synthetic rubber than can be absorbed domestically (page 702).

The International Rubber Study Group estimates that 3,860,000 long tons of new rubber will be consumed in the world in 1960 . . . The organization estimates that 2,135,000 long tons of natural rubber and 1,810,000 long tons of synthetic rubber will be available for consumption (page 659).

The United Rubber Workers Union has initiated a drive to win wage increases for 100,000 rubber workers with the filing of a wage re-opener notice with the Firestone Tire & Rubber Co. . . . Re-opener clauses with other rubber companies will soon be invoked (page 681).

HAVE
YOU TRIED

HUBER'S AROMEX ISAF
HUBER'S AROMEX HAF
HUBER'S AROMEX CF
HUBER'S ARROW MPC
HUBER'S WYEX EPC
HUBER'S AROGEN GPF
HUBER'S AROVEL FEF
HUBER'S MODULEX HMF
HUBER'S ESSEX SRF

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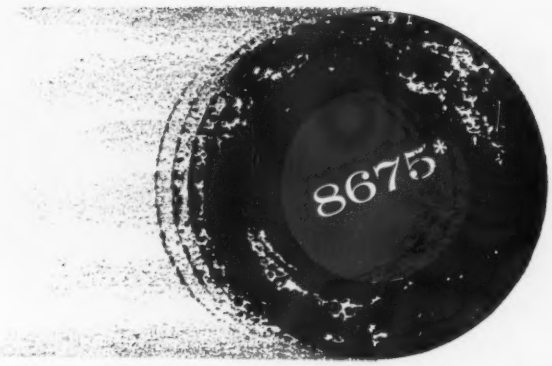
Carbon Blacks • Clays • Rubber Chemicals

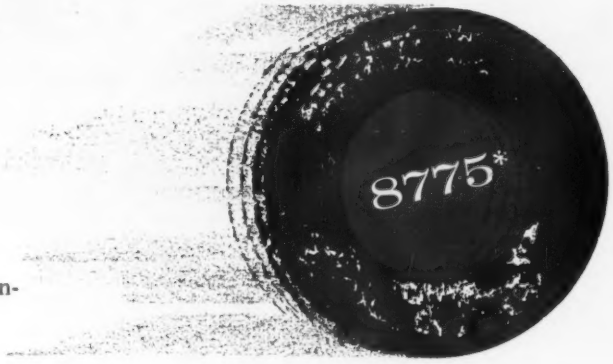
Wise owls read Huber Technical Data. Ask to be put on our mailing list.

MORE MILES PER MIL



WITH THE NEW BAYTOWN MASTERBATCHES

Road test results prove new Baytown black masterbatches offer the highest tread wear ratings available.



10% higher tread wear ratings than conventional masterbatches.

BUT

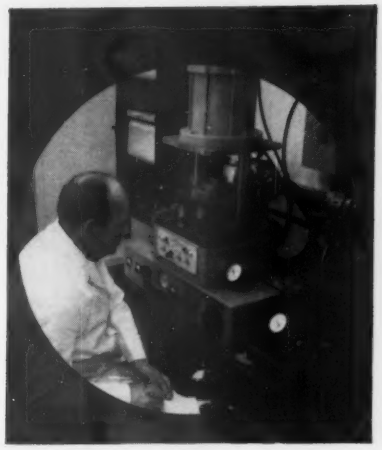
Tread wear is only one measure of masterbatch performance.

The new products combine the traditional Baytown black masterbatch uniformity, ease of handling and processibility with these improved tread wear ratings.

For more mileage on the road and in your plant, check on the new Baytown black masterbatches.

*ASTM Designation

MORE MILES PER MIL



PLUS FINEST PROCESSING OF FIRST LINE TREAD

At the United Carbon Service Laboratory higher tensile results and lower Mooney values have been recorded.

8675 100 parts SBR copolymer
50 parts HAF black
9 parts naphthenic oil
rosin/staining

8677 100 parts SBR copolymer
52 parts HAF black
10 parts high aromatic oil
rosin/staining

8775 100 parts SBR copolymer
75 parts HAF black
37.5 parts aromatic oil
mixed/staining

BAYTOWN—THE BIRTHPLACE OF BLACK MASTERBATCH

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In Canada: CANADIAN INDUSTRIES LIMITED

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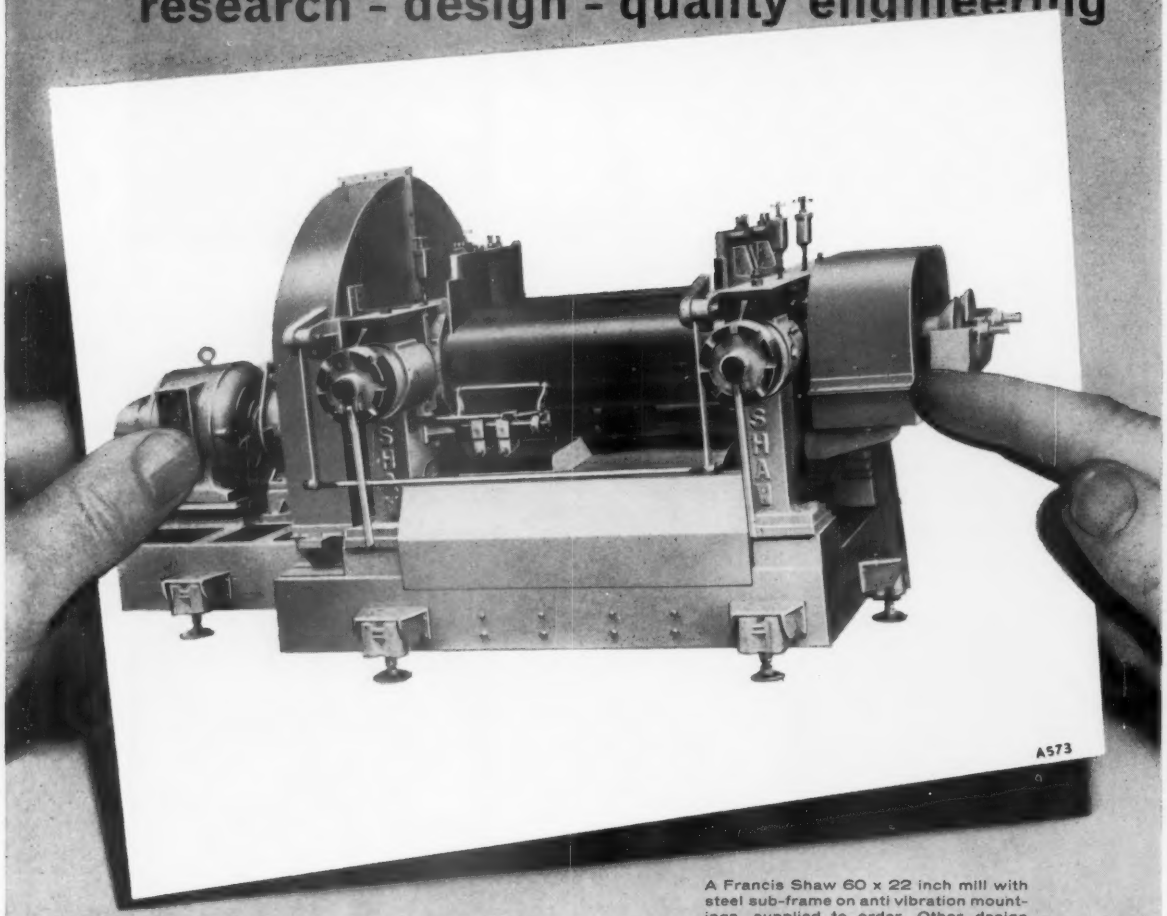
behind every

Francis Shaw machine

research - design - quality engineering



A Francis Shaw 60 x 22 inch mill with steel sub-frame on anti vibration mountings, supplied to order. Other design features available include:

* Power operated nip adjustment
* Single or double gearing
* Lunn safety gear
* Flood lubrication

Constant research and development, close co-operation with users, advanced design, selected high quality materials . . . These, coupled with long experience, help to create processing machinery of unrivalled performance.

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OVERSEAS AGENTS THROUGHOUT THE WORLD

P4351

—as used to make better flower pots at Schacht Rubber Mfg. Co., Inc., Huntington, Indiana.

Unbreakable and Unbeatable—because it's made of PLIOFLEX!

Drop one of these flower pots, it bounces back for more. Use it for years, the bright color won't peel or change.

The reason? It's molded of PLIOFLEX 1773, an oil-extended synthetic rubber by Goodyear.

Why PLIOFLEX 1773? The primary reasons are unusually light color and low cost. Also important are high uniformity and good physical properties which minimize rejects—a vital factor in a volume business. Then, too, its shipment in film-wrapped bales, protected by multiwall bags on nonreturnable pallets, keeps down handling costs and losses.

More information on PLIOFLEX—the many types available and how they might help you—yours by writing Goodyear, Chemical Division, Dept. S-9419, Akron 16, Ohio.

GOODYEAR

CHEMICAL DIVISION

Plioflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

CHEMI-VIC puts you on the right track against ozone attack!

The basic feature of new CHEMI-VIC is well described in the photograph above. That's CHEMI-VIC on the left, compared to a similar, currently popular elastomer, after 144 hours in an ozone box (100 pphm) at 100°F.

CHEMI-VIC is brand new—a vinyl reinforced nitrile elastomer. In addition to outstanding resistance to ozone and weather, it offers high physical properties plus exceptional resistance to oil. Moreover, it's easy to compound and process on standard equipment.

New CHEMI-VIC is available in two grades: CHEMI-VIC 400 for general purposes. CHEMI-VIC 800 for extrusion and calendering application. Typical uses: hose, belting, wire and cable jacketing, weather stripping, integral molded shoe soles. More information? Just write Goodyear, Chemical Division, Dept. S-9419, Akron 16, Ohio.

Lots of good things come from

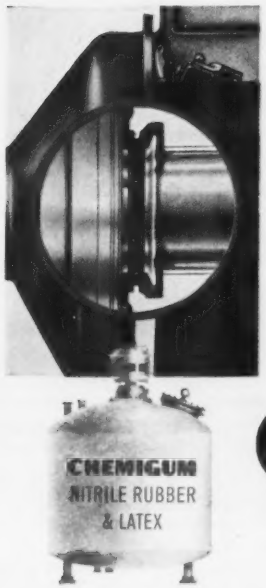
GOODYEAR

CHEMICAL DIVISION

Chemi-Vic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Photographs taken through the cooperation of Brummer Seal Co., Chicago Heights, Illinois

Another "seal of approval"—won with CHEMIGUM!



A long-time problem to automotive engineers and designers was the leaking of oil from rear main bearings. Seals of leather, fiber, metals and other materials just didn't do the right job.

Exhaustive study by a leading manufacturer led to a series of specially designed seals made with CHEMIGUM. CHEMIGUM was chosen because of its outstanding resistance to oil and heat, its toughness and abrasion-resistance and its processability that permitted easy production of smooth, close-tolerance, tight-sealing rings.

Thoroughly proved on the test rack and the test track, these seals of CHEMIGUM have won the approval of a number of manufacturers—are now at work on over a million automobiles. How can CHEMIGUM help your product win similar acceptance? For details write Goodyear, Chemical Division, Dept. S-9419, Akron 16, Ohio.

Lots of good things come from

GOODYEAR

CHEMICAL DIVISION

Chemigum—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

coming events

July 18-22. Gordon Research Conferences, High Pressure Research, Kimball Union Academy, Meriden, N. H.

July 18-22. Gordon Research Conferences, Radiation Chemistry, New Hampton School, New Hampton, N. H.

July 22. Chicago Rubber Group, Annual Golf Outing, St. Andrews Country Club, Chicago, Ill.

July 25-29. 13th International Congress on Occupational Health, Waldorf-Astoria Hotel, New York, N. Y.

Aug. 1-5. Gordon Research Conferences, Instrumentation, Colby Junior College, New London, N. H.

Aug. 2. New York Rubber Group, Annual Golf Outing, Forsgate Country Club, Jamesburg, N. Y.

Aug. 7-13. Columbia University Industrial Research Conference, Arden House, Harriman, N. Y.

Aug. 8-12. Gordon Research Conferences, Chemistry and Physics of Solids, Kimball Union Academy, Meriden, N. H.

Aug. 14-17. American Society of Mechanical Engineers-American Institute of Chemical Engineers, Joint Heat Transfer Conference and Exhibit, Statler-Hilton Hotel, Buffalo, N. Y.

Aug. 15-25. International Symposium on the Chemistry of Natural Products, Melbourne, Canberra and Sydney, Australia.

Aug. 16-19. Society of Automotive Engineers, National West Coast Meeting, San Francisco, Calif.

Aug. 19. Philadelphia Rubber Group, Annual Summer Outing, Manufacturers' Country Club, Oreland, Penna.

Aug. 28-Sept. 6. Third Materials Handling Exhibition, Oslo, Norway.

Aug. 29-Sept. 2. Gordon Research Conferences, High Temperature Chemistry, Kimball Union Academy, Meriden, N. H.

Sept. 6-7. Chemical Institute of Canada, Organic Chemistry Subject Division, Divisional Conference, Edmonton, Alberta, Canada.

Sept. 6-16. Product Engineering Show and Machine Tool Exposition, Navy Pier, Chicago, Ill.

Sept. 7-9. American Society of Mechanical Engineers, Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Sept. 8-9. Textile Quality Control Association, Fall Technical Meeting, Clemson House, Clemson, S. C.

Sept. 8-9. Tenth Canadian High Polymer Forum, Alpine Inn, Montreal, Quebec, Canada.

Sept. 8-10. Chemical Institute of Canada, Western Regional Conference, Regina, Saskatchewan, Canada.

Sept. 10. Connecticut Rubber Group, Technical Meeting.

Sept. 10. Northern California Rubber Group, Summer Outing.

Sept. 10-17. Fifth International Instrument and Measurements Exhibition and Conference, Stockholm, Sweden.

Sept. 11-14. National Tire Dealers & Retreaders Association, Annual Convention and Trade Show, Kansas City, Mo.

Sept. 11-16. American Chemical Society, 138th National Meeting, Hotel Commodore, New York, N. Y.

Sept. 12-16. International Rubber Shipping and Packing Conference, Singapore, Malaya.

Sept. 12-16. International Instrument-Automation Conference and Exhibit, Los Angeles, Calif.

Sept. 12-17. Third International Congress of Surface Activity, Cologne, West Germany.

Sept. 12-20. Twenty-Third International Shoe and Leather Exhibition, Vigevano, Italy.

Sept. 13-15. American Chemical Society, New York Section, Chemical Exhibition, Hotel Statler, New York, N. Y.

Sept. 13-16. Division of Rubber Chemistry, American Chemical Society, Fall Meeting, Hotel Commodore, New York, N. Y.

Sept. 15-16. American Society of Mechanical Engineers, Engineering Management Conference, Morrison Hotel, Chicago, Ill.

Sept. 15-16. Armed Forces Chemical Association, 15th Annual Meeting, Sheraton-Park Hotel, Washington, D. C.

Sept. 19-23. International Rubber Study Group, 15th Meeting, Kuala Lumpur, Malaya.

Sept. 21-23. Society of the Chemical Industry, Plastics and Polymer Group Symposium, London, England.

Sept. 22. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

Sept. 22-23. Chemical Market Research Association, Fall Meeting, Wentworth-by-the-Sea, Portsmouth, N. H.

Sept. 22-Oct. 30. Chemical Equipment Exposition, Busto Arsizio, Italy.

Sept. 25-28. American Institute of Chemical Engineers, Mayo Hotel, Tulsa, Okla.

Sept. 26-28. Standards Engineers Society, 9th National Convention, Pittsburgh-Hilton Hotel, Pittsburgh, Penna.

Sept. 26-30. Instrument Society of America, 15th Annual Meeting, International Instrument - Automation Conference and Exhibit, New York Coliseum, New York, N. Y.

Sept. 26-30. Third Canadian National Material Handling Show and Conference, Show Mart, Montreal, Quebec, Canada.

Sept. 26-Oct. 1. International Conference on Natural Rubber Research, Kuala Lumpur, Malaya.

Sept. 27-28. National Cotton Council, 9th Chemical Finishing Conference, Statler Hotel, Washington, D. C.

Sept. 29. Southern Ohio Rubber Group, Fall Meeting, Engineers Club, Dayton, Ohio.

Sept. 30. Rubber Chemical Salesmen's Association of Akron, University Club, Akron, Ohio.

Oct. 4. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

October 4-7. International Rubber Conference, West Berlin, Germany.

Oct. 9-12. American Society of Mechanical Engineers, Rubber and Plastics Conference, Lawrence Hotel, Erie, Penna.

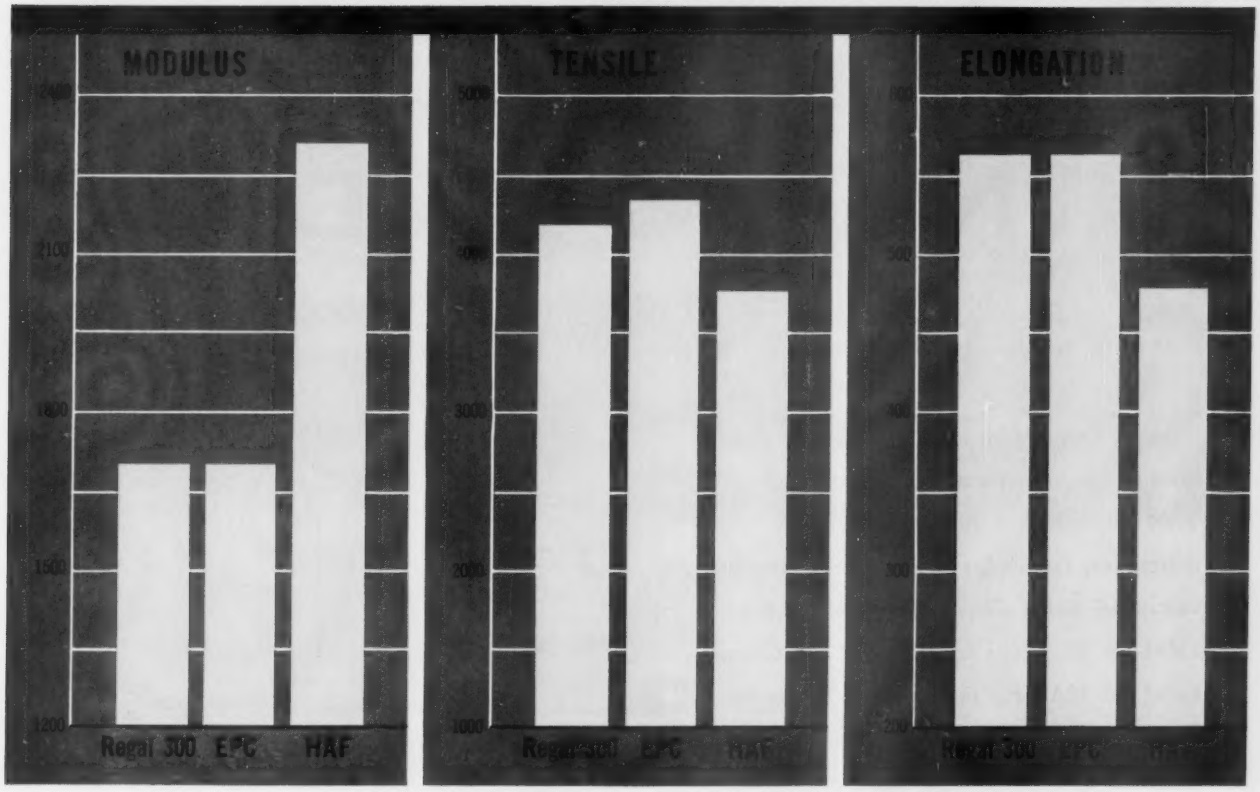
Oct. 17-19. International Congress on Technology of Plastics Processing & International Plastics Exhibition, Amsterdam, The Netherlands.

Oct. 11-13. Second International Synthetic Rubber Symposium, Church House, Westminster, London, England.

Oct. 19-26. Second International Plastics Fair, Macroplastics, Utrecht, The Netherlands.

NEW REGAL® 300

HAS ALL THE WEAR AND TEAR RESISTANCE OF PREMIUM-PRICED CHANNEL BLACK *and doesn't cost as much....*



Regal 300* is a new oil furnace black recommended as a lower cost replacement for channel black in rubber applications.

It provides rubber properties virtually identical with those of premium-priced channel blacks, but with the faster curing rate of HAF types. The similarity in stress-strain properties between Regal 300 and EPC black and the contrast with HAF black are illustrated above.

Although Regal 300 falls near the particle size and surface area range of a channel black or an HAF black, the "structure" of this new black, as indicated by its low oil absorption, is similar to channel black and significantly less than has been previously available from an oil furnace black in this particle size range.

Regal blacks have been road tested and proved in more than 3,000,000 tire miles of road tests. Fully comparable with EPC black in modulus, tensile and elongation properties, Regal 300 has actually outperformed channel blacks in wear and tear resistance, cracking and chipping, in both passenger car tire and truck tire road tests.

Definitely recommended for highway, off-the-road truck and passenger car tire treads and tread rubber, Regal 300 gives service which is typical of channel black resistance to tearing, cutting and chipping. And it offers the economic advantages of being manufactured from oil.

Regal 300 is just one of a new family of blacks developed by Cabot research, including Regal 600 — a totally new type of oil furnace black for passenger car tire treads and tread rubber, and Regal SRF, the first semi-reinforcing carbon black to be made from oil.

Call your Cabot man for complete technical data . . . or use the coupon.

***One of a new family of Regal blacks, developed by Cabot research and produced by a new, exclusive manufacturing process from oil, now available world-wide — another step in Cabot's long range program to meet threatened gas shortages and rising natural gas prices.**

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125 HIGH STREET, BOSTON 10, MASSACHUSETTS

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ADDRESS

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St. Joe surface-treated zinc oxides are very stable in storage, because the coated particles are hydrophobic and do not absorb moisture and CO_2 from the air to form agglomerates. They disperse in a rubber mix rapidly and thoroughly, developing physical properties in vulcanized rubber comparable to standard Black Label No. 20, Green Label No. 42 and Green Label No. 42A3. For these reasons, St. Joe surface-treated zinc oxides are recommended for all uses in which unusual and difficult dispersion problems are encountered.

Grade	Black Label 20-21	Green Label 42-21	Green Label 42A-21
Ave. Particle Size D_1—Microns	.20	.28	.28
N_2 Specific Surface—Sq. M/gram	10.91	5.27	5.27
Total S and SO_3	.05	.05	.35
Apparent Density—Lbs./cu. ft.	25	45	45
Curing Rate	Fast	Fast	Slow

The above grades are also available in the form of Free-Flowing, Dustless Pellets having an apparent density of 60 pounds per cubic foot.

For further information, write for St. Joe's Technical Data Booklet.

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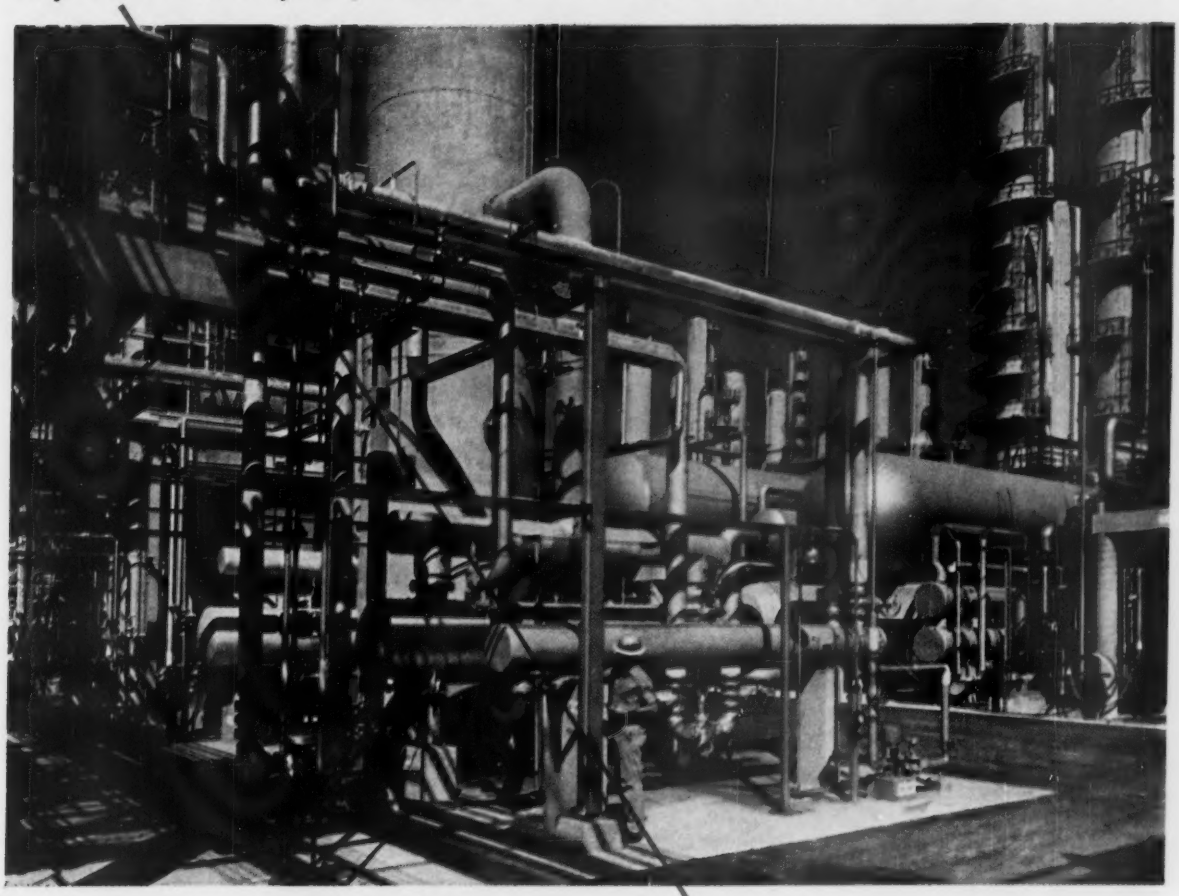
ZNO-157

Important Quality Improvements in *Petro-Tex n-BUTENE-1*



Deliberate removal of undesirable olefins from our commercial production of Petro-Tex n-Butene-l has resulted in a very substantial quality improvement over the past two years.

Our specifications guarantee a minimum purity of 95% Butene-l, maximum water content of 100 ppm *and no butadiene whatsoever.* But a typical analysis of our commercial production as shipped is: Butene-l *98.0%;* Isobutylene *0.6%;* Butene-2 *0.8%;* n-Butane *0.6%* and water 20 ppm. In most chemical reactions, these impurities are not detrimental.

Petro-Tex n-Butene-1 is now being used by important linear olefin polymer producers. As a highly reactive alphaolefin, it undergoes a wide range of oxidation, hydration, alkylation and oxo-process reactions which commend study of its use for n-butyl alcohol, butylene oxides as well as various copolymers and petrochemicals.

We invite inquiries on Petro-Tex n-Butene-1 and

n-BUTENE-2 ISOBUTYLENE

BUTADIENE DIISOBUTYLENE TRIISOBUTYLENE

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PETRO-TEX CHEMICAL CORPORATION

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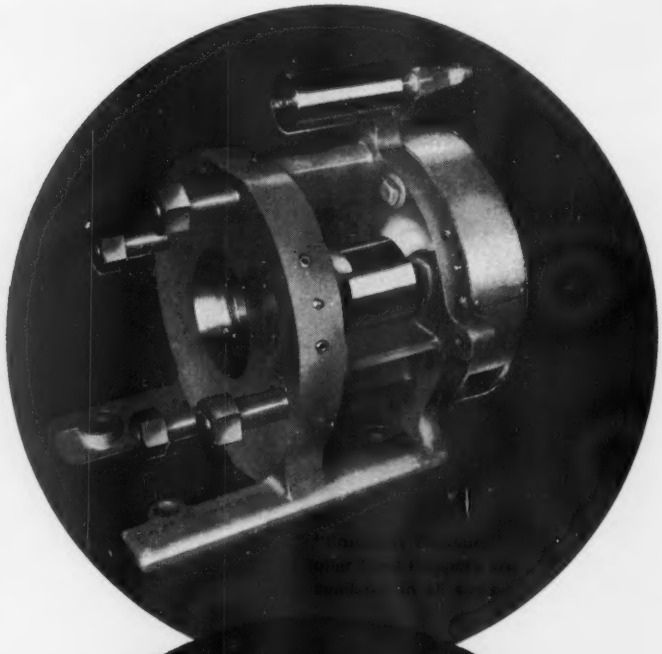

No. 1 Royle Extruder for Rubber with Roller Feed Hopper.

With a ROYLE "Constant Pressure" Roller Feed Hopper, mechanical rubber goods and insulated wire can be produced to extremely close tolerances.

There are many advantages to using a "Constant Pressure" Roller Feed Hopper:

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Improved Product Density

Increased Production through High Speed and Less Waste

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Royle "Constant Pressure" Roller Feed Hoppers are suitable for all sizes of extruders.

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News about

B.F.Goodrich Chemical *raw materials*

Endicott Johnson Corporation, Endicott, New York, makes these shoes using Hycar. The plain soles are oil-resistant and non-conductive. The soles with the green spot are oil resistant, made for Lehigh Safety Shoe Company. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

Shoe soles get more "sell" from Hycar

Standing up on oily or greasy floors calls for a shoe sole that really stands up—which is why these soles are made of Hycar nitrile rubber. Oils, solvents and corrosive chemicals that would quickly destroy ordinary rubber aren't a problem when you use Hycar.

Abrasion resistance is outstanding under any conditions, and on oily floors shoe soles made with Hycar outwear ordinary rubber many times. Also, Hycar is easy to process, an added advantage for shoe sole manufacturers.

Hycar is often the answer to tough product problems. It gives new advantages and simplifies processing, often helping improve a product or opening whole new markets. For more facts, write Dept. FA-8, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
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Rubber and Latex

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News about

B.F.Goodrich Chemical *raw materials*

MAJOR IMPROVEMENT * IN NITRILE RUBBER!

* **Aids fabrication**

* **Gives superior oil and heat resistance**

* **Blends easily with SB-R and other rubbers**

These three Hycar polymers have proved their processing and fabrication advantages in field operations. They provide significant physical improvements to give superior end-product properties.

These polymers combine a range of oil and solvent resistance with superior processing characteristics. Tensile is improved with higher elongation and lower moduli. Solubility is excellent both milled and unmilled to give lower cement viscosities. Aging and abrasion properties are also excellent. All three blend well with SB-R and other rubbers and their compatibility with many resins makes them valuable as modifying agents.

For samples or further information about these or other Hycar rubbers and latices, write Dept. FA-7, B.F.Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, O. Cable address: Goodchemco. In Canada: Kitchener, Ont.

See our catalog in Sweet's Product Design File.

Hycar
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ETHYLAC®, an excellent nonstaining, nondiscoloring primary accelerator, can also improve the processing characteristics and ultimate physical properties of Hevea and SBR compounds containing other accelerators. Small additions of ETHYLAC provide delayed action activation for Hevea compounds cured with thiazole-type accelerators, and for SBR compounds cured with either thiazoles or sulfenamides.

The data below summarize the results with ETHYLAC and MBTS. More detailed data on ETHYLAC activation with other thiazole and sulfenamide-type accelerators are given in Bulletins S-130 and S-141, available on request. Ask your Pennsalt representative or write Industrial Chemicals Division, PENNSALT CHEMICALS CORPORATION, Three Penn Center, Philadelphia 2, Pa.

MBTS Activated with ETHYLAC

	Hevea-HAF Black Tread Stock								SBR 1500-HAF Black Tread Stock							
MBTS	1.0				1.0				1.0				1.0			
ETHYLAC	—				0.4				—				0.5			
Mooney Scorch																
T-5 @ 266°F.	10.3				10.6				25.0				23.8			
Cure, min. @	284°F.				284°F.				302°F.				302°F.			
	M300	T	E	H	M300	T	E	H	M300	T	E	H	M300	T	E	H
20	1725	3825	600	65	2625	3450	410	74	325	950	760	51	1025	2675	610	57
30	2025	3325	530	68	2900	3425	380	75	575	1825	725	52	1700	2950	430	61
40	2100	3975	530	66	3100	3400	350	73	825	2575	675	53	1975	3025	400	64
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capitol cues

THE SPRING PICK-UP IN BUSINESS has brightened prospects for the rest of this year. It has calmed once general fears of an easing in the economy in the second half. Analysts now feel that coming months will bring further gradual rise. They don't expect to see any decline before early next year.

Businessmen waited all Winter to see what April and May would bring. They had sensed that inventory-buying might fall off. And the government had already started to take in more than it spends. They were waiting for the consumer to save the day. But early buying of autos, appliances, etc., was only so-so. Weather was a factor, but was it the only reason for lags?

April and May bore out the hopes of those who were counting on the consumer. His higher buying brought gains elsewhere.
- Retail sales were up a healthy 6% during April and climbed again in May. Better weather spurred autos and appliances.
- Employment expanded by several million in April and in May.
- Unemployment fell sharply, to well below the 4 million mark.
- Industrial output held at a high rate during April and May, despite the big slump in steel production. Gains centered in the soft goods, chemicals, printing, and textiles.

THE OUTLOOK FOR BUSINESS DURING THE REST OF '60 is for continuation of the Spring uptrend. Economists in government and industry are now very confident that activity will keep rising at a steady, gradual clip.

Here are some of the trends the analysts expect:
- Auto sales will continue to increase, helped by special sales by dealers. Production already has begun to move up. Volume this Fall, when new models are introduced, will jump sharply.
- Textiles will see high-level activity as apparel sales hold up.
- Housing will be increasing in coming months. Mortgage credit is becoming easier, and builders will expand their activity.
- Machinery will benefit from industry's plans to increase its plant capacity. Capital spending will go up 15% or so in '60.

Not every line will participate in the upturn. In some, stocks are high and demand is leveling. But easing lines will be few.

STEEL OUTPUT MAY STILL SET A RECORD THIS YEAR, even though activity at mills slumped this Spring. Heavy stocking up by users lifted production in the first quarter to 93.8% of capacity. Spring output, with inventory-buying slowing, averaged about 72%. Third-quarter production will hold to about the same range, but a substantial gain is seen for the fourth quarter.

STILL FURTHER EASING OF MONEY CAN BE EXPECTED during the months ahead. Officials believe that, while the business outlook is good, there is now no reason to fear renewed inflation. They will not have to keep the reins so tight. Indeed, a little ease may insure good times. So the Federal Reserve will act to expand the lending power of banks. As a result, more credit will be available. However, its costs--interest rates--probably won't fall much.

NONFERROUS METALS WILL HAVE A GOOD YEAR, even though sales won't live up to the bright forecasts made back in January. With the rest of business moving up, the demand for all metals will be strong in the coming months.

Here's a rundown on prospects for the most important metals:
-Aluminum output will exceed 1959's total by 6% to 7%, with actual shipments going up a bit more. Use in auto making will go up 25%. A price increase may be posted this Fall.
-Copper sales will rise some in coming months, but prices are expected to remain stable. Inventories are adequate.
-Lead and zinc will see substantial gains. Zinc volume is likely to gain 8% to 10%, as auto use expands. For lead, the increase will be 4% to 5%. Price increases for zinc are possible, but a world surplus will work against lead.

A RELAXATION OF RULES ON PROGRESS PAYMENTS to defense contractors may now be in the works. Present policy, adopted during the 1957 economy drive, allows a contractor only 80% of costs in advance of completion of the work. The new policy would go back to paying up to a maximum of 100% of the costs. The Defense Department doesn't want to make the shift, but it is under heavy pressure from the Congress and from important military contractors to do so.

Some restrictions in negotiating contracts by the Pentagon also may be coming. Both the General Accounting Office and Congress have been saying more contracts should be let by competitive bidding. The House Armed Services Committee will push a measure for more open bidding in the next Congress.

MANY BILLS IMPORTANT TO BUSINESS WILL BE LEFT OVER at the end of this session of Congress. As a result, they will die, and all of the legislation that fails to become law will have to start through the mill again after the new Congress meets next January. Here are some of the bills left hanging.

-Farm supports: A bill may be passed in '60, after elections.
-Antitrust: The anti-merger laws may be tightened in 1961.
-Transportation: Reduced regulation may be voted in 1961.
-Natural gas: Less regulation may be blocked again next year.
-Bond rates: Higher rates won't be approved next year, either.
-Depressed areas: The Democrats will try again to help in '61.

HOW WILL THE NEXT PRESIDENT STAND ON BUSINESS ISSUES? Richard Nixon's policies won't be the same as Senator Kennedy's or Symington's, or Johnson's. But it's going to make a big difference which one gets to the White House--in your taxes, in the regulation of your industry, and in the general climate.

Here, from past speeches and Senate votes, are their positions:
-Nixon: His policies would differ from Eisenhower's in many ways. But, he's still a conservative, close to the GOP view.
-Kennedy: He may be the most liberal of leading Democrats. He would probably give the U.S. another Fair Deal Administration.
-Johnson: He's in the center of the spectrum. But, on many of the issues he would act like a down-the-line New Deal liberal.
-Symington: He's somewhere between Kennedy and Johnson. On most questions, though, you can count on him to think like Truman.

QBX-1 and QBX-1E, two new masterbatches from Marbon, are the most economical and efficient form of high-styrene resin reinforcement available today. Many of the time-consuming properties of less-efficient forms have been removed, with resultant increases in production and quality of end product. QBX-1 and QBX-1E, for general purpose and electrical grade, will meet and pass the most rigid tests. We will be happy to send you a sample for your own testing.

1. Uniform stacking and palletizing
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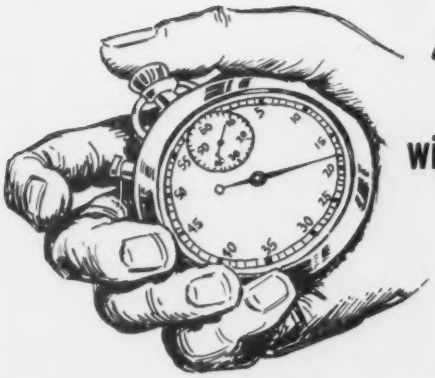

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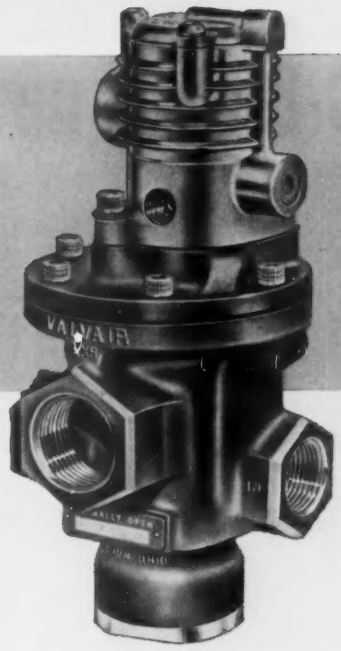

HI-SPEED INLINE with integral pilot, 2- or 3-way, NO or NC, 3/8 to 1¼ in. NPT.

Short poppet travel in Valvair's HI-SPEED INLINE provides maximum flow almost instantaneously. This shortens machine cycle time . . . lessens brake and clutch slip . . . provides more accurate cuts on high speed cut-offs . . . decreases set-up time . . . minimizes drift, for safer operation.

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Write for free Bulletin HIN. Address: Bellows-Valvair, Akron 9, Ohio, Dept. RA-760.

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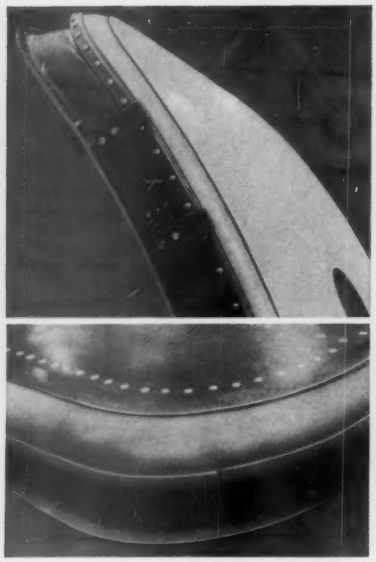
DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

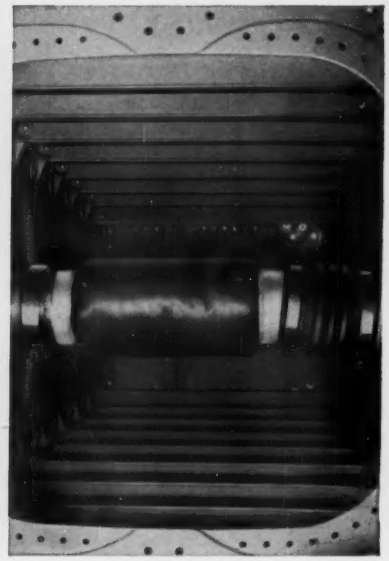
8110-3

DC-8 uses newest G-E silicone rubbers

RTV compound used for caulking and sealing. RTV (room temperature vulcanizing) silicone rubber cures without the application of heat in any time you select up to 48 hours. It won't shrink (no solvents); forms no voids. RTV has excellent bond strength—plus resistance to high temperatures (above 600°F), moisture, weathering, ozone, aircraft fuels and solvents. Tough, elastic, good electrical properties.



SE-555 silicone rubber gaskets on door (above) and hatch. SE-555 has substantially double the strength of ordinary silicone rubbers. It combines maximum resistance to weather and temperature extremes (−150°F to 500°F) with the high tensile and tear strength previously found only in organic rubber. SE-555 meets AMS 3345 standards and can be fabricated in any color, including white.



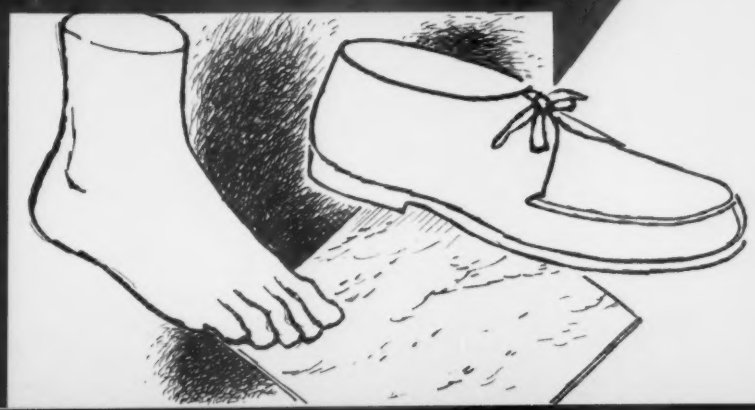
Hot air duct of glass-cloth-reinforced Class 700 silicone rubber with flexible connectors of same material. (Ends sealed with General Electric RTV.) Ducts of G-E Class 700 silicone rubber have a service range from −120°F to 600°F and in other applications carry air up to 700°F. They resist common aircraft fuels and lubricants, have low compression set, and will not "cold flow" away from clamps.

For application data on G-E silicone rubbers, write General Electric Company, Silicone Products Dept., Section HH7R7, Waterford, N. Y.

GENERAL ELECTRIC

Silicone Products Dept. **Waterford, N. Y.**

Some useful information for the men who shape the things we stand on...

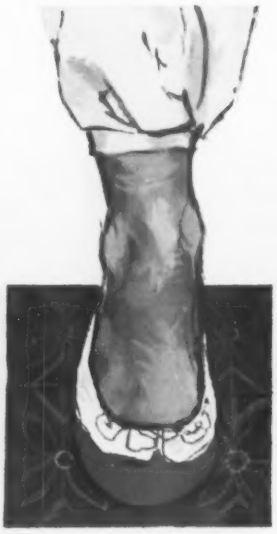


18,000 B.C.—Mousterian man was self-shod, and gingerly trod a clay-and-gravel floor. His was a lifetime sort of footwear and the wearers had to be calloused customers.

800 B.C.—The soft leather shoe of ancient Persia gave excellent footing on floors of polished tile. The shoe looked like a small girl's pump, but the wearers were really tough warriors.

300 B.C.—Alexander and Archimedes wore simple sandals like these in the marbled halls of ancient Greece. It's a far cry from the spring and wear of a modern S-Polymer shoe sole.

800 A.D.—Cold steel on colder flagstone marked the medieval knight. No pussyfoot was he. With a built-in gong on either foot, no wonder his feats ring through the Ages.



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SP-103

A resin-rubber masterbatch, SP-103 offers similar advantages because the rubber hydrocarbon in SP-103 *is* S-1509. SP-103 is made from equal parts of S-1509 and high styrene resin for added abrasion resistance, gloss, stiffness and durability.

Light Color . . . Nonstaining and nondiscoloring S-1509 and SP-103 are excellent for white stocks because of their own inherent light color and also because they need no discoloring peptizing agents.

Low Viscosity . . . S-1509—by itself or in SP-103—has a viscosity range of 30-38; it needs no breakdown and comes to you ready for immediate processing even in sponge applications.

Outstanding Physical Properties . . . Properties of S-1509 stocks closely compare with those of plasticized high Mooney counterparts.

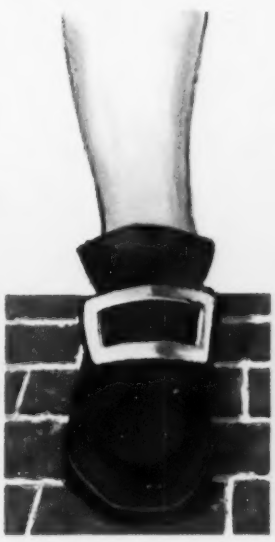
Superior Mold Flow . . . Stocks made with S-1509 and SP-103 provide sharp design

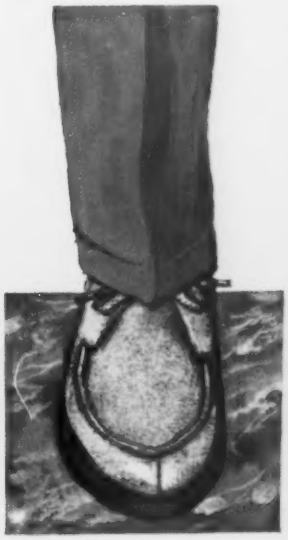
1300 A.D.—When the Mayan dandy wanted shoes he simply milked a rubber tree and used his foot for the mold. Use of *shoe soup* was free to all. The style was crude; the fit perfect.

1776 A.D.—Freedom of the feet came fast on the heels of tyranny with light, comfortable walking shoes and smooth, quick-drying brick walks. It was an era of advanced "understanding."

1890 A.D.—Patent leather shoes with spats on slick parquet floors marked a night out during the Gaslight Age. Elegance outweighed wear and corns were epidemic.

1960 A.D.—Ultimate in "footwork" is the comfortable shoe sole made with an S-Polymer. S-Polymers also give us handsome, long-wearing rubber tile, luxurious sponge rug underlay, and dozens of other products.





today's "footwork"

transfer from the most intricate mold to the finished product.

Reduced Mixing Time . . . Your in-plant mixing time is significantly reduced with SP-103 because the resin is added at the latex stage and is thoroughly dispersed.

Reduced Scorch . . . When you use SP-103 instead of mixing in clear resins yourself, there is less tendency to scorch because shorter mixing time is required, making possible lower mixing temperatures.

Convenience and Economy . . . SP-103 comes to you in free-flowing crumb form, minimizing loss of material and dust problems encountered with clear resins.

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Raw compounded stocks giving you trouble because of:

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You'll find that just a little bit of "A-C" Polyethylene Lubricant added to raw compounded stocks will cause an **unbelievable** improvement, plus such added economies as: Shorter mixing cycles • Less power consumed • Faster calendering and extruding rates • Cleaner molds • Lower percentage of rejects.

"A-C" Polyethylene Lubricants are available in a wide range of grades for specific uses. Write for technical advice on applying them to your products.

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PATENT REVIEW

by Melvin Nord

Determining Thumping Tendency of Tires

U. S. Patent 2,920,481, issued Jan. 12, 1960 to William H. Hulswit, Jr., Daniel R. Elliott, and Eugene H. Culp, assigned to United States Rubber Co., covers an electrical method of determining, quantitatively, the propensity of a tire to thump objectionably at various speeds.

A tire, inflated to normal operating pressure, is mounted on a front wheel suspension assembly (12) which is carried by a portion (13) of an automobile side frame. One end (14) of the frame member is attached by a pivot (15) to a fixed supporting standard (16) while the other end (17) of the frame is unsupported. A weight-holding device (18) hangs from the unsupported end of the frame, so that the load imposed on the test tire through the frame may be varied by adding or removing weights of known value at the holder, as shown in Figure 1, below.

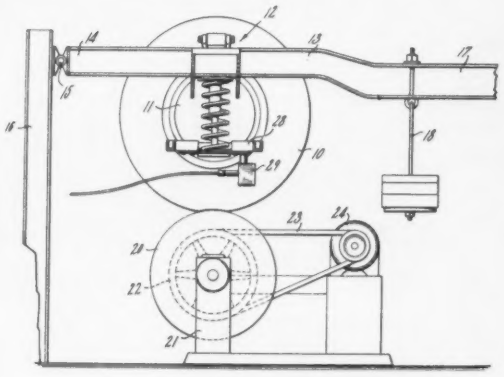

Figure 1

The test tire rests upon a supporting wheel assembly (20), mounted below the tire on trunnions (21). A pulley (22) is connected by a driving belt (23) to a variable-speed, reversible, electric driving motor (24), that is equipped with conventional control means which enable the operator conducting the test to provide a desired range of speed in either direction. The tire is rotated during the test by the supporting wheel upon which it rests.

Near the wheel (11) on a lower arm (28) of the wheel suspension, an electrical pick-up device (29) is fastened, comprised of a phonograph pick-up, bearing phonograph needle (30) with a small weight (31) fastened at its end, in place of the customary point or jewel. The pick-up is arranged

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PATENT REVIEW

to respond to vibration in a vertical plane, and has a natural frequency of 30 cycles per second. It is responsive to vibrations ranging from 20 to 300 cycles per second. The pick-up is electrically connected to a conventional amplifier (35) designed to give uniform amplification to vibrations within the range of about 20 to 300 cycles. Associated with this amplifier is a conventional filter (36), which is designed so that the maximum signal is passed by the filter at a frequency of about 60 cycles per second, while the signal passed by the filter below 30 and above 120 cycles is only about one-half the strength of the signal imposed at those frequencies. Below 15 and above 250 cycles, only about one-eighth of the imposed signal is passed.

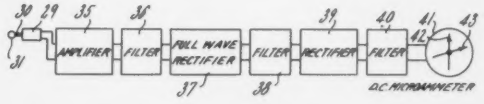
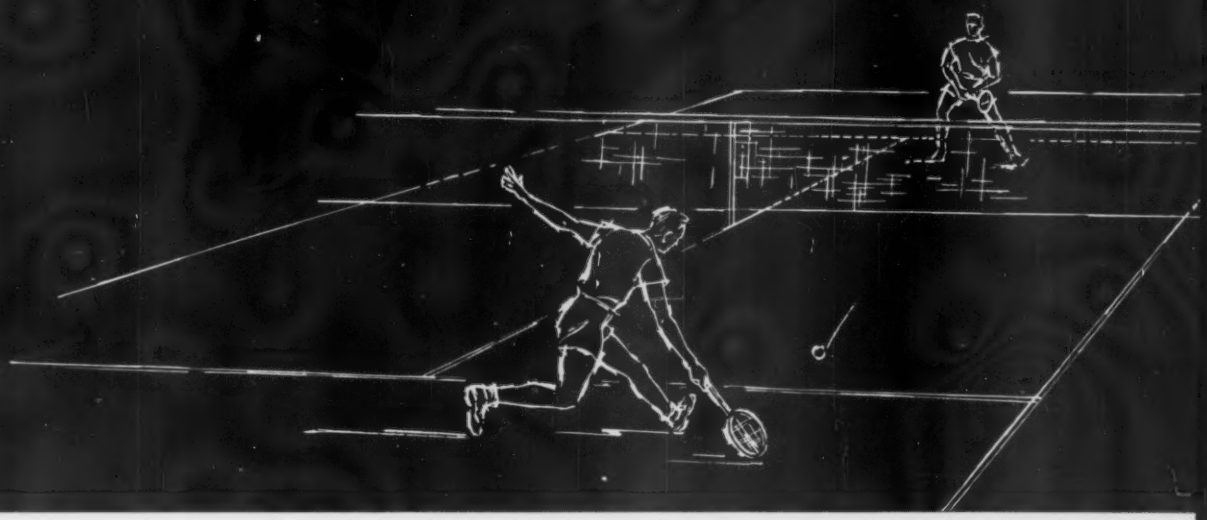


Figure 2

The signal is then passed from the filter (36), as in Figure 2, into a full wave rectifier (37). The output of the rectifier is passed to a second filter (38), the purpose of which is to remove all of the oscillations except the wave of fundamental frequency from the signal. The second filter should be designed so that the maximum signal is passed at a frequency of about 3 cycles per second, while the signal passed below 1.5 and above 6 cycles per second is only about one-half of the strength of the signal imposed at those frequencies; below 0.75 and above 12 cycles, it should be only about one-eigth of the signal.

The maximum response of the second filter (38) occurs at a point somewhat lower than the average fundamental frequency of rotation of the tire over the typical range of test speeds (4 to 8 cycles per second). This arrangement is preferred, as it removes more completely any residuum of the originally strong "wheel-hop" component (around 12 cycles per second) from the signal. The electrical output of the second filter is put into a form that can be measured with a direct current meter by passing it through a suitable rectifier (39) and filter (40) into a direct current micro-ammeter (41) in the conventional manner. The micro-ammeter is provided with the usual needle or pointer (42), which indicates the average value of the amplitude of the final, isolated, fundamental signal. An auxiliary idler or tell-tale pointer (43) on the meter indicates the value of the maximum signal registered in the course of any test. The tell-tale needle is reset manually at a low position at the start of each test.

EYE ON THE BALL



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PATENT REVIEW

Isomerization of Non-Vulcanized Rubber

U. S. Patent 2,892,004, issued June 23, 1959 to Herbert Bartl and Wilhelm Becker, assigned to Farbenfabriken Bayer A.G., relates to improvements in the preparation of derivatives of rubber formed by the action on rubber of isomerizing agents such as halides of certain non-metallic elements, for instance boron fluorides, in the presence of solvents.

The isomerizing agent and solid undissolved rubber are added to the solvent simultaneously. At a sufficiently high temperature (e.g., 130°C.) isomerization and dissolution of the rubber take place within a few minutes in a strongly exothermic reaction to give a low viscous solution. The solution is precipitated by a mixture of acetone and alcohol, then dried.

The isomerization product is a light-colored resinous substance which dissolves in gasoline to give a mobile solution.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Process for applying numerals to neoprene wire	General Electric Co.	2,920,384	1/12/60
Resilient vehicle wheel	Rand-Goetze Corp.	2,920,673	1/12/60
Automatic sealing ring for bagless vulcanizing presses	Cleveland Trust Co.	2,921,337	1/19/60
Method of making solid tire wheels	Indus Corp.	2,921,344	1/19/60
Bipartite casing for pneumatic tire	Leopold Findler	2,291,617	1/19/60
Rubberized mineral-tar composition	Goodyear Tire & Rubber Co.	2,921,919	1/19/60
Foam rubber strip manufacturing	General Motors Corp.	2,923,029	2/2/60
Stabilization of rubber against oxidation	Imperial Chemical Industries, Ltd.	2,923,752-3	2/2/60

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

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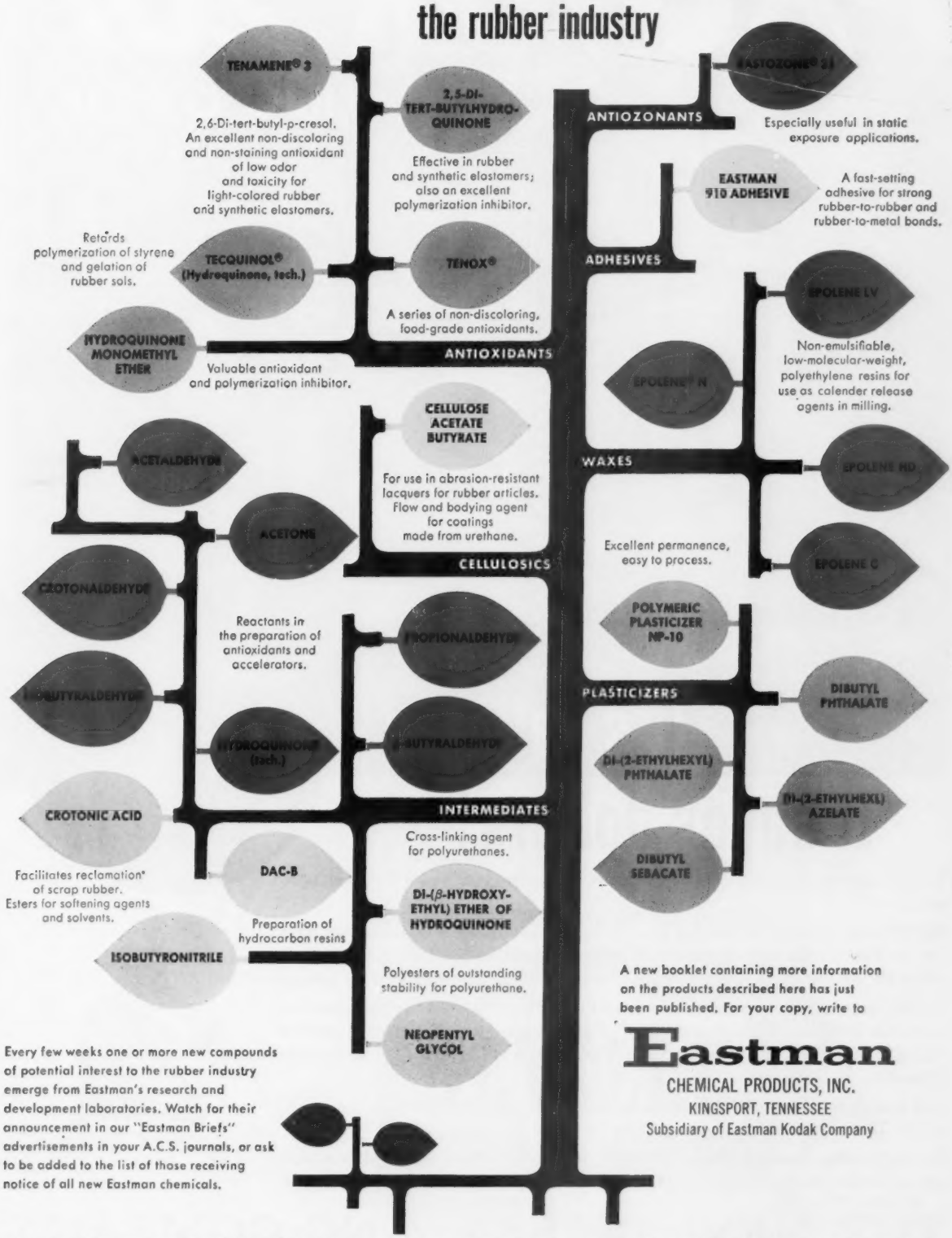
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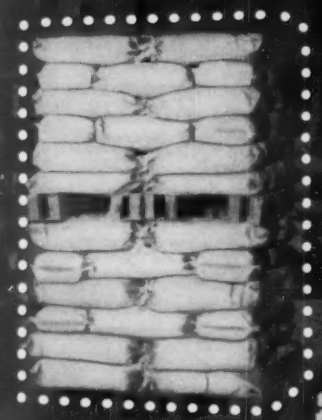

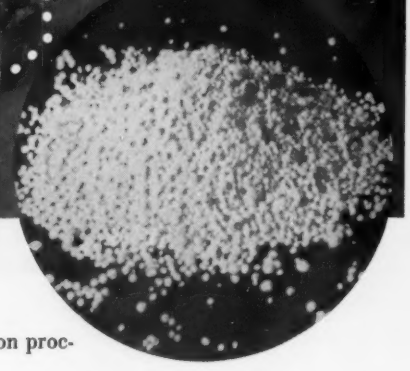

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U.S. Patent 2,303,330

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• The resurgent German rubber industry made a notable showing at the Deutsche Industrie-Messe, the annual trade fair held this Spring at Hanover from April 24 to May 3. The event, which has been a traditional meeting place of European big and small business for more than thirty years, used to be staged in Leipzig but, since that city became part of the East Zone, was relocated in new exposition grounds at the West German industrial center.

Displays of rubber products were scarcely representative, however. The Stahlgruber firm of Munich, for example, was the only one exhibiting automobile tires. Molded rubber goods manufacturers, on the other hand, came up with 15 displays. They included one French company, R. Couqueberg of Saint-Denis/Seine, as well as some major German producers, Acla-Werke A.G. of Cologne, Kalle A.G. of Weisbaden, Westland Gummiwerke G.m.b.H. of Westerhausen, and Pampus of Buederich near Dusseldorf.

The real news for U.S. visitors was the impressive presentation of German processing machinery in the synthetic and natural rubber sections. In addition to the standard mixers, rolling mills, vulcanizers and calenders, there were specialized lines of injection molding equipment and vacuum forming machines featuring latest designs. We shall be hearing more, no doubt, about fabricators like Alfred Gutmann of Hamburg, Hahn & Kolb of Stuttgart, Schulte-Maschinenbau G.m.b.H. of Dusseldorf, and Torkret G.m.b.H. of Essen. More than a dozen exhibits bore proof of Germany's long experience with synthetics and its ability to embody new techniques in precision equipment.

• About 50 per cent of the production of the Chemische Werke Huels, the largest European Buna factory, is used for the manufacture of automobile tires. The company increased its monthly production to 10,000 tons of synthetic rubber last month.

• A Firestone factory in Portugal, located in Alcochete on the Tejo River, went on stream at the end of May. The Portuguese subsidiary of the American company is the most modern Firestone European factory.

• A few months ago the United Carbon France S.A., a subsidiary of United Carbon Co., Houston, Tex., began construction of a new carbon black factory with an initial capacity of 25,000 tons a year. The building, located at Port-Jérôme, will require an expenditure of 25 million French francs ($5 million); the factory will go on stream during the first quarter of 1961. Hitherto United Carbon has exported considerable amounts of carbon black to France; now the company will manufacture the required carbon black in its own factory.

The town of Port-Jérôme was selected upon the recommendation of the French government and the leading French producers of rubber, paints and printing inks. The factory's location will make it possible to supply the many customers of the American company located in the North and center of France.

• The Netherland Plantation Society, the N. V. Rubber Cultuur Maatschappij in Amsterdam, and the Hamburg importing concern Nordmann, Rassman & Co., have organized a new plantation company in Liberia. The enterprise has a vast area of land at its disposal, and production of a considerable amount of natural rubber is planned.

• The Italian Pirelli concern will build a tire factory in Patras, Greece, with an initial capacity of 240,000 tires. It will employ about 500 people. Pirelli will advance about 90 per cent of the necessary funds and the factory is expected to go on stream within 18 months. The Italian concern also plans to build a large tire factory in Turkey.

• Based upon growing volume during 1959, the board of directors of Phoenix Gummiwerke A.G., Hamburg-Harburg, has proposed an increased divident of 11 per cent, and a 3 per cent bonus for the common shares, amounting to 25 million DM ($5,950,000). One of the major shareholders is the Firestone Tire & Rubber Co., Akron, Ohio; major interests are administered by Moritz Schultze Erben and the Muenchner Rueckversicherungs-Gesellschaft.

The directors have suggested increasing the number of common shares, to raise 10 million DM ($2,480,000) within the next five years. The new funds will be used to adjust the amount of working capital to the increased business volume and to supply additional capital for new machinery and equipment. In view of the increasing importance of plastics in the manufacturing program of the company, and the requirements of the European common market, modern equipment is urgently needed by the company.

On The Continent (cont'd)

• The Deutsche Kautschuk-Gesellschaft, Frankfurt, (German Rubber Society), the association of rubber chemists and technicians, is preparing for an international congress which will take place in Berlin from October 4 to 8. About 1,000 scientists and technicians from 13 nations, and about 60 other experts from 12 countries are expected to meet in Berlin.

The program will focus on newly developed forms of synthetic rubber which are ready for manufacture on a large scale. In addition, new combinations of synthetic rubber and synthetic staples will be discussed for the first time. The synthetic staple industry will participate, and international developments will be discussed at length.

The German Rubber Society has issued a report stating that the world consumption of natural and synthetic rubber which amounted to 2.34 million tons in 1950 will increase this year to more than 3.9 million tons. Ten years ago the ratio of natural to synthetic rubber was three to one. This year 55 per cent is natural rubber, and 45 per cent synthetic rubber. In Germany proper the total consumption of all types of rubber has risen from 83,300 tons in 1950 to almost 244,000 tons this year. At the same time, synthetic rubber has increased its share of the market from 4.1 to 39.7 per cent. For many years after the war 70 per cent of synthetic rubber production was processed by the tire industry and only 30 per cent was used for other purposes; now due to new technical developments, the ratio is 50:50.

The Germany Rubber Society estimates that all production facilities for synthetic rubber in the world can be rated at approximately 3 million tons. The United States has 24 factories with a capacity of 1.8 million tons. Twelve factories in Soviet Russia are estimated to deliver approximately 500,000 tons. All the communist countries are supposed to produce a total of 670,000 tons, of which 90,000 tons are manufactured in the East German Buna-Werke in Schkopau. The largest West European producer is West Germany with 160,000 tons; the second place is held by Great Britain with 90,000 tons, and Italy is in third place with 70,000 tons. World capacity in 1970 might conceivably reach 5.6 million tons; however many doubt that this figure will be reached because of the high capital expenditures it would require.

• The cornerstone for a European subsidiary of the Firestone Tire & Rubber Co. was laid recently in the French city of Bethune, about 18 miles southwest of Lille. The new factory, requiring an investment of about $12 million, will be equipped with French machinery, will employ French workers, and will be managed by French executives. The factory will be finished before the end of the year and will have an initial capacity of 4,000 tires a day.

• A few weeks ago a Japanese delegation consisting of representatives of the manufacturers of machines for the rubber and plastic industry visited Mexico and dropped in at the office of the publication, *Hule Mexicano y Plasticos*. The directors of the Nippon Roll Manufacturing Co. of Tokyo, one of the major producers of rubber machinery and equipment for the plastic industry, are exploring the possibility of doing business not only with Mexico, but with a number of South American countries. Comercial Tropical S.A. represents the Japanese concern in Mexico.

• Attempts to determine the criteria for a good antivibration mount material are discussed by J. C. Snowdown in *Revue Générale du Caoutchouc*. The author concludes, first, that such a material should possess a high damping factor which does not increase greatly with change of frequency, and, second, that it should be free of any major increase in dynamic modulus due to frequency change.

Transmissibility measurements on a variety of resilient materials indicate that high damping synthetic rubbers normally possess a dynamic modulus which increases rapidly with frequency. It is shown that this modulus increase is responsible for the unsatisfactory insulation afforded by these rubbers at frequencies above the resonant frequency of the mounting system, and not their inherent high damping as commonly supposed.

Filled butyl rubber is an exception, affording an insulation at high frequencies which is not greatly inferior to that of natural rubber, yet at the same time possessing much higher damping.

• In order to familiarize the German public with the benefits offered by synthetic rubber, the Farbenwerke Bayer A.G. in Leverkusen, Germany, has produced a 35-minute color movie describing the many uses of synthetic rubber, its characteristics and its adaptability.

The film shows rubber being tested, and illustrates its great tensile strength, its resistance, and its buoyancy. The development of synthetic rubber about 50 years ago, in the Farbenwerke Bayer, is shown, as well as the historical patent application for a procedure "to manufacture synthetic rubber." One sequence demonstrates the development of a new rubber product, starting in the research laboratory and following the product through the testing grounds to its completion in the production department.

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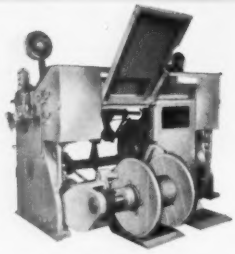

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News in Brief

► A $5,000 award has been granted the American Institute for Foreign Trade by the Goodyear Foundation, a non-profit corporation supported by Goodyear Tire & Rubber Co., Akron, Ohio, as part of the firm's aid-to-education program.

► Chemical Sales Co., Denver, Colo., has been appointed distributor for Antara Chemicals, a sales division of General Aniline & Film Corp., New York, N. Y. The Denver firm will distribute the line of surfactants, sequestering agents, iodophors, glycols and other products manufactured by Antara.

► A bulletin on the company's portable and hand tachometers has been made available by Electro-Mechano Co., Milwaukee, Wisc. The instruments are for general shop and laboratory testing of rotational speeds on almost any type of equipment, and eight standard ranges are listed in the brochure.

► Designed for the engineer, a new bulletin on "Custom Engineered Fabricated Silicone Rubber" has been issued by the Taunton Division of Haveg Industries, Inc., Taunton, Mass. It describes engineered seals for the aircraft, electronic and appliance industries; precision molded parts, extruded parts, sheet and die cut parts.

► Color difficulties arising when fabrics are coated with latex or used in contact with latex products, is the problem treated in the brochure "Gas Fading Characteristics of Latex Antioxidants," made available by the Industrial Chemicals Division of Pennsalt Chemicals Corp., Philadelphia, Penna.

► Three new technical reports, from Godfrey L. Cabot, Inc., Boston, Mass., describe Regal 300, Regal 600, and Regal SRF, a new line of blacks introduced by the company. Ask for RG-103, RG-104 and RG-105.

► The economic advantages and the usefulness of vacuum forming as a technique for producing plastic products are covered in a new 20-page booklet published by the Plastics Division of Eastman Chemical Products, Inc., 260 Madison Ave., New York 16, N. Y.

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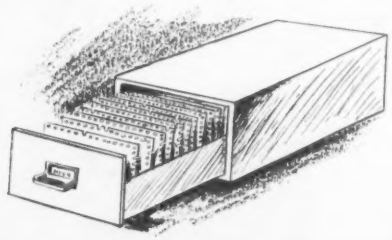

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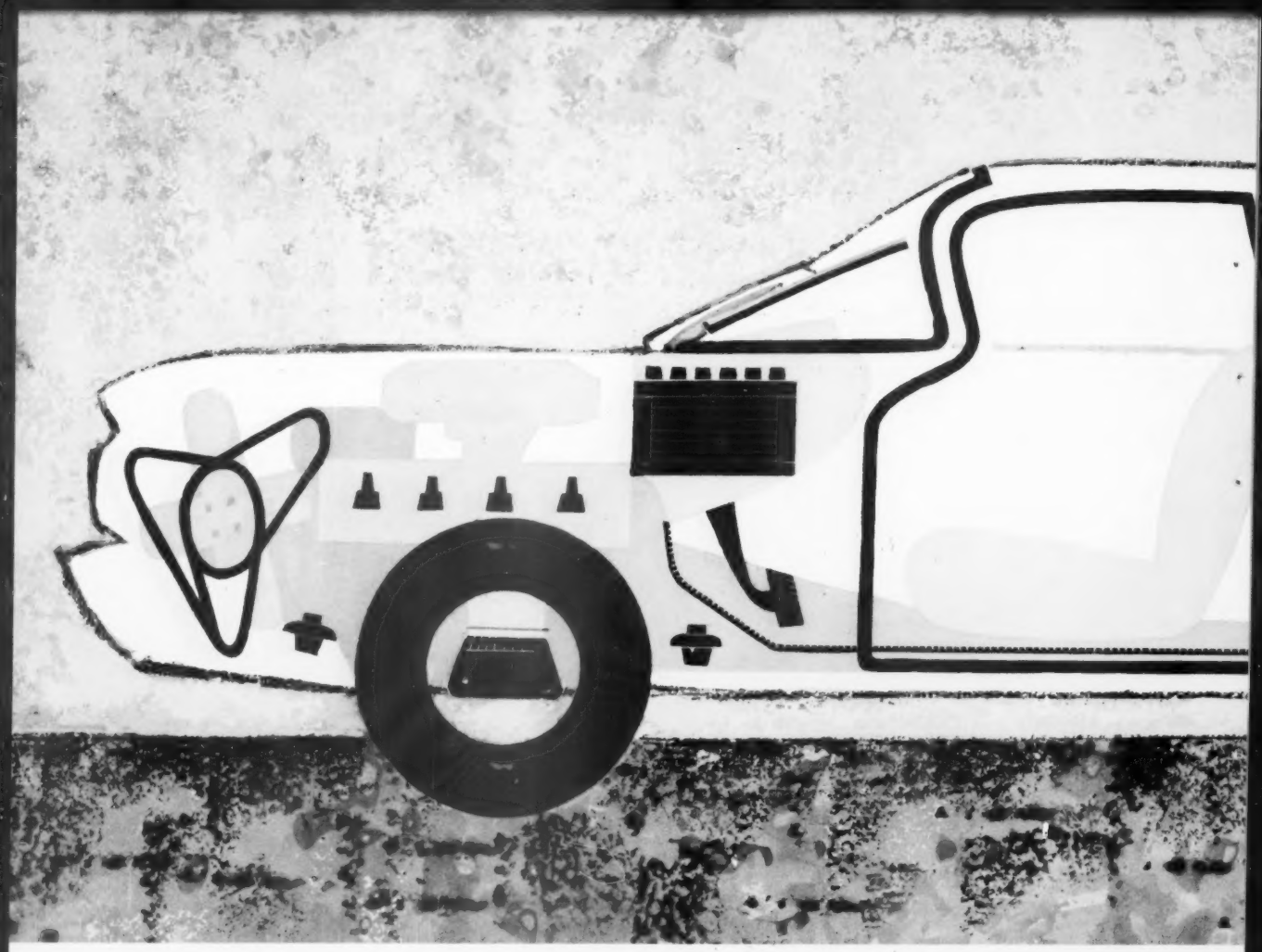

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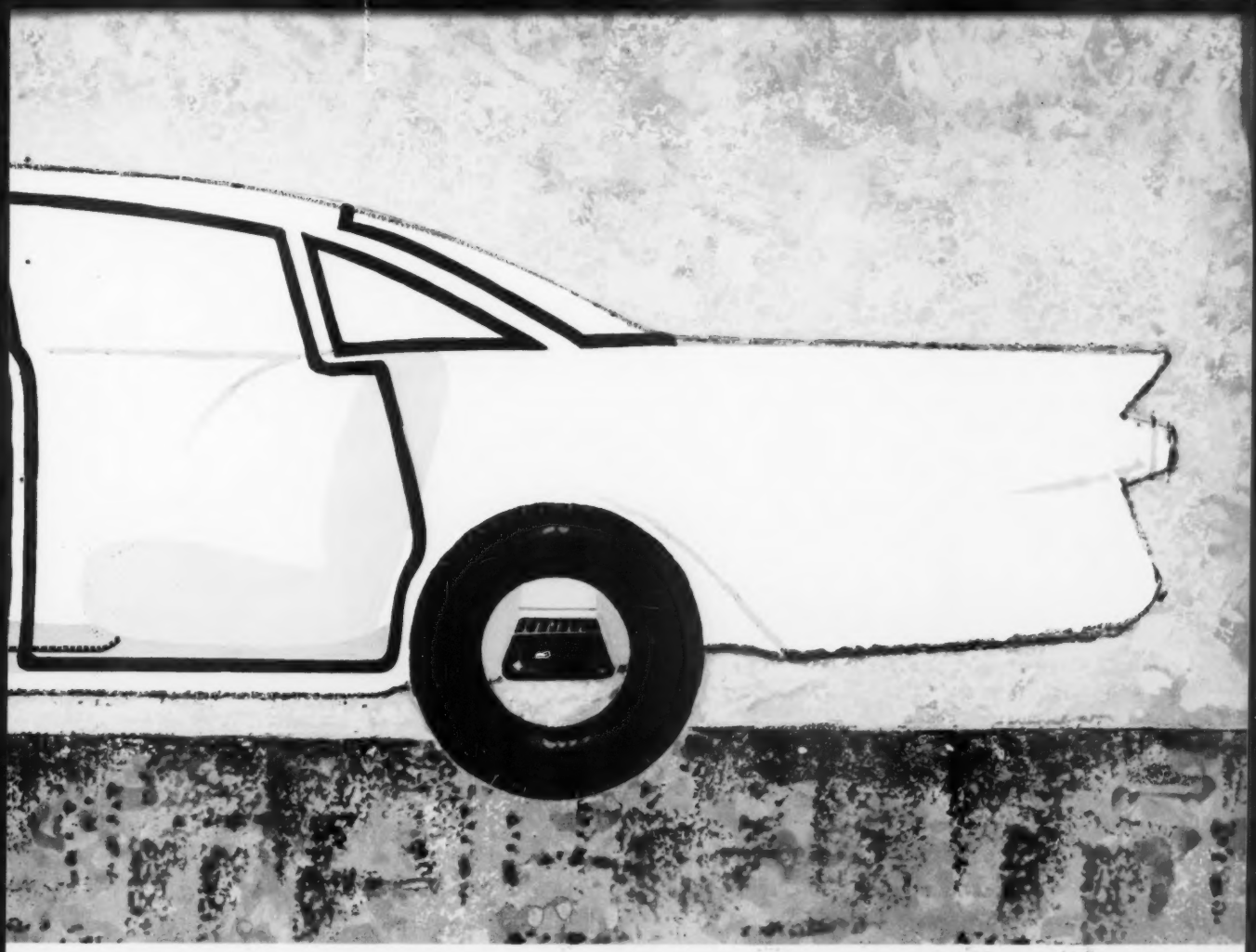

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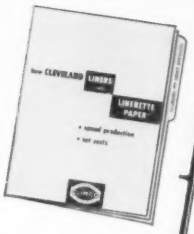

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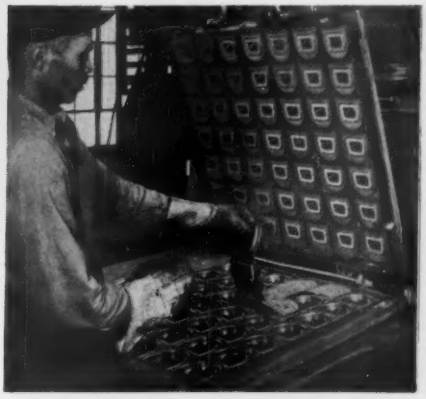

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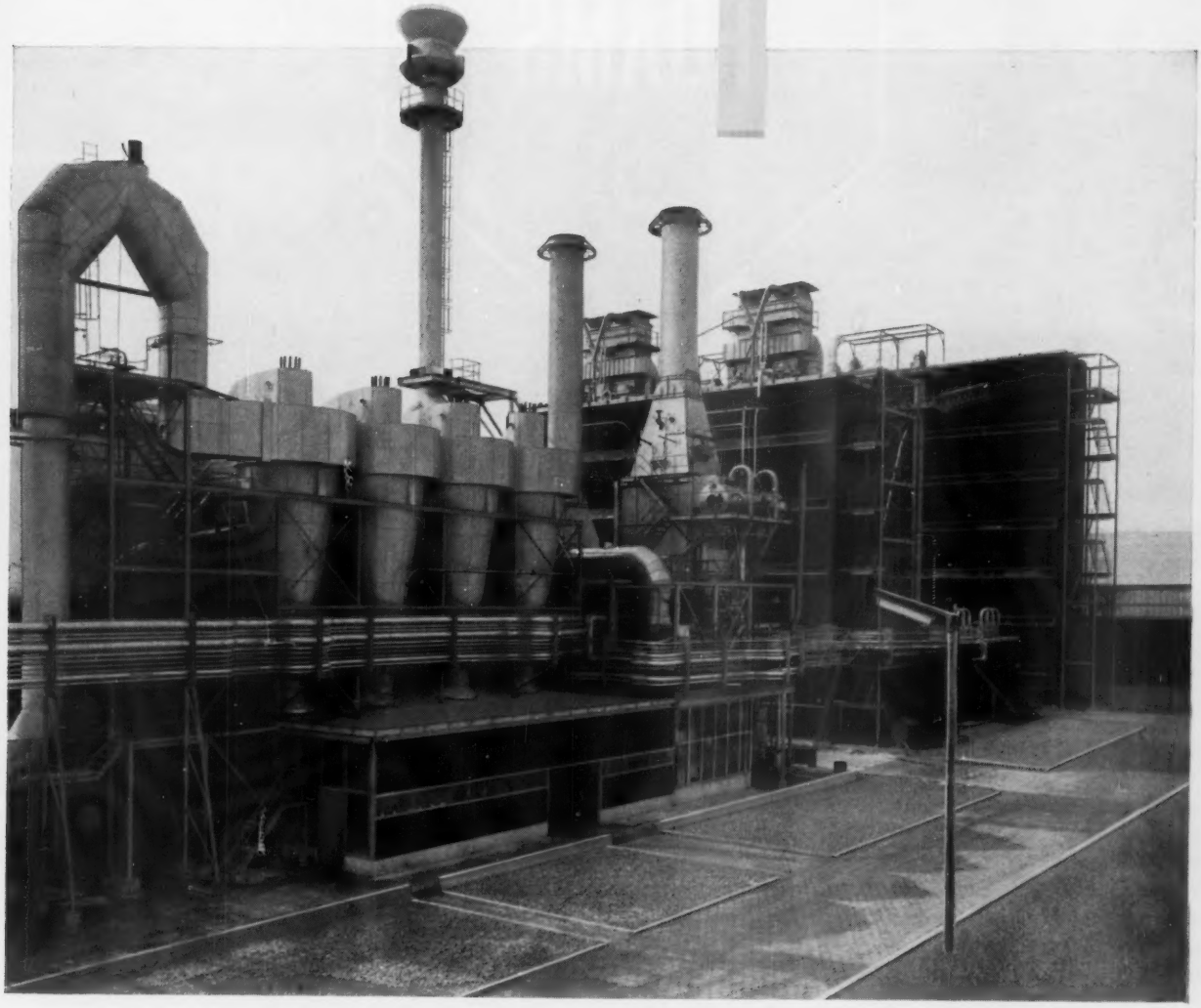

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JEFFERSON CHEMICALS

049

As Ken Soule Sees It

by Kenneth J. Soule

Do-It-Yourself Baseball

An interesting gadget has appeared on the home baseball scene this spring, which might well lead to a whole new crop of "bonus babies" in the not too distant future.

The device in question is called a "live action net," or "pitch back," and consists of a frame of tubular steel, with a tightly stretched net of nylon inside it. Sort of a specialized trampoline. In use the frame is propped up in a near perpendicular position and a ball thrown or bounced against the net. The speed and direction of the rebound can be infinitely varied, depending on the velocity and angle of the original pitch. Thus, one or more enterprising young ball players can practice pitching, catching hard grounders or tricky fly balls, etc., etc., as long and as diligently as they have a mind to.

Three sizes are available—the 30″ x 30″ at $4.95, the 36″ x 36″ "Little League Size" for $6.95, and the 42″ x 48″ for about $10! Any of these should be a bargain for doting papas who might be delighted to get out of the job of trying to keep up with their tireless young sons, or who would merely welcome the chance to spare the family garage from the endless rebound of baseballs.

Cross-Country Saga

Rudyard Kipling, in his classic poem "Boots," immortalized the rhythmic cadence, as well as the grinding monotony, of British infantry feet slogging their way through 30 odd miles per day, day after day. This spring two Royal Air Force sergeants put on their own modern version of "boots movin' up and down again" as they relentlessly hiked from West to East, across the United States.

The walkathon started April 12 at the Golden Gate Bridge in San Francisco, when Flight Sgt. Patrick Moloney (age 34) and Staff Sgt. Mervyn Evans (33), both paratroopers, set their sights for New York City. To add a measure of zest to the jaunt, Dr. Barbara Moore, a 56 year old Russian-born British lady vegetarian left S. F. about the same time, vowing to reach New York first. All three contestants had done a great deal of long-distance hiking, particularly in England, prior to the American expedition.

As most readers will remember from the extensive newspaper and magazine coverage, the trampers encountered every kind of weather and hiking condition—including desert heat, freezing temperatures, torrential rains, near gale winds, etc., etc. However, the three pushed steadily on with the sergeants inexorably inching ahead, so that by the time the lady doctor reached Brazil (Indiana) she was more than 500 miles in arrears. At this point she was unluckily bumped by an auto, and needed a two-day hospital rest. Meanwhile the soldiers plowed on, reaching the N. Y. C. Coliseum in 66 days, 4 hours, and 17 minutes. This is indubitably a new record.

The best previous times listed in the books were A. L. Monteverde's 1929 crossing in 79½ days, and Edward Weston's 1910 hike from L. A. to New York in 77 days. The British sergeants smashed both records; a beautifully planned and most courageously carried out campaign. Our heartiest congratulations to all concerned!

A couple of sidelights which may be of interest: The sponsors of the winning team were ITS Rubber Ltd. of Petersfield, which makes the "Commando" rubber soles and heels incorporated in standard British army combat footwear, and which the sergeants wore on this hike. Also Hall and Sons, Stoke Golding, makers of "Indestructible" 100 per cent nylon socks, the sergeants' choice as well. Apparently an excellent combination—"look ma, no blisters!" Incidentally, the original soles lasted all the way—only casualties, one pair of rubber heels.

It was most appropriate that Britons should capture the new record since Edward Weston in 1879 walked 550 miles in England in 141 hours and 41 minutes. For this he was awarded the Astley belt as "the world's champion walker." In 1910, at 71, his 3,483 mile jaunt from L. A. to New York City was at an average rate of 45.6 miles per day, almost the exact rate clocked by the new champs. In the intervening 50 years the road builders have knocked about 480 miles from the coast-to-coast distance by straightening out many of the curves.

Magnetism Plus

Magnetism is a pretty complex subject and this hardly seems the time or place to demonstrate how much (or how little) I know about it. The main reason for bringing it up at all is to comment briefly on several distinctly different processes noted in the literature on the subject, which still have a common background.

The first is the transfer of ferrous parts at fast speeds from one place to another. The objects being carried are supported on conveyor belts of various kinds—rubber, plastic, non-magnetic metal, etc.—but held in place during their journeys by the magnetic force exerted by permanent non-electric magnets placed underneath the belting. Savings in time, space, and material are three basic claims made for this type of automation. It is also said that working and safety conditions are improved by the use of such installations. Eye-catching examples are the handling of "tin" cans on a conveyor traveling through right angle turns and down perpendicular runs from one floor to another, and finally to the point where they are filled. Also, the conveyance of all sizes and shapes of ferrous stampings, sheets, etc., to and through dip, spray, coating, and baking operations by means of simple made-to-

order racks which hold the objects securely with non-electric permanent magnets, doing away with the need for cumbersome and awkward pin hooks, special holes, etc. . . .

Competent engineers would no doubt be familiar with several concerns which deal in such non-electric magnets. We, personally, have no such knowledge or interest. We happen to have looked over some of the trade literature of Eriez Mfg. Co., Erie, Penna., and found it interesting. They claim to be "pioneers, and the world's largest producer of permanent non-electric magnetic equipment for industry."

The second instance noted was in Esso Oilways, (March, 1960). We suspect that this is similar in considerable degree to some of the work noted above, but let's not quibble. The process is described as "a new coolant cleaning system, developed by the Barnes Drill Co., Rockford, Ill." The purpose is to remove impurities, which gradually build up in the oil used to cool sheet-steel, from the cold rolling mills. These contaminants cause pits and flaws in the surface of the sheet.

The solution developed proved to be a magnetic separator unit through which the oil was passed. In this unit a rotating inner drum had been made magnetically attractive by passing it over permanent magnets. As the oil to be cleaned flowed over the drum, the small ferrous contaminants were attracted to it and removed, as well as a large portion of the "tramp oil" picked up in process. This oil is not magnetic but, being more viscous than the coolant oil, tended to adhere to the ferrous particles. Q.E.D. everything came clean.

Item number three: "The NEW combination hot plate and magnetic stirrer, designed and manufactured by E. H. Sargeant and Co., Springfield, N. J." Source of information: an advertisement in *"The Indicator,"* May, 1960. The hot plate has a stainless steel case and a cast aluminum top plate, but at the moment our chief attention concerns the stirrer. This seems to involve two parts. One, the heavy duty stirring motor, with speed controlled by a rheostat if desired, and two, the 1⅛ and 1½ inch molded Teflon-covered stirring bars. Sounds like a scientifically practical, as well as a muscle saving, way to stir up hot solutions without wasting a lot of time over a hot hot-plate.

The Ladies Bless 'Em!

Now for the fourth and last exhibit of applied magnetism. These are small, almost petite, items, but they could easily prove to be much more important than all the others put together. In a word, they are earrings. Not the ordinary ear squeezing, tension producing garden variety, but *magnetic earrings*. In use a separate, small magnetic piece is held behind the ear lobe while the jeweled or ornamented portion is placed on top of the same ear lobe. *Presto*—magnetism securely and painlessly holds each and every such earring in its appointed place until its lovely wearer decides to take it off.

Imagine: No more worry over lost jewelry of this type, no more scrounging around under theater seats or church pews, or beneath someone's dining table. But, above all, the elimination once and for all of five hundred million woman hours of nagging irritation and nervous tension. This could well be the small but potent sedative needed to start the world back on the long, long, road toward sanity and world peace again!

Cool Construction

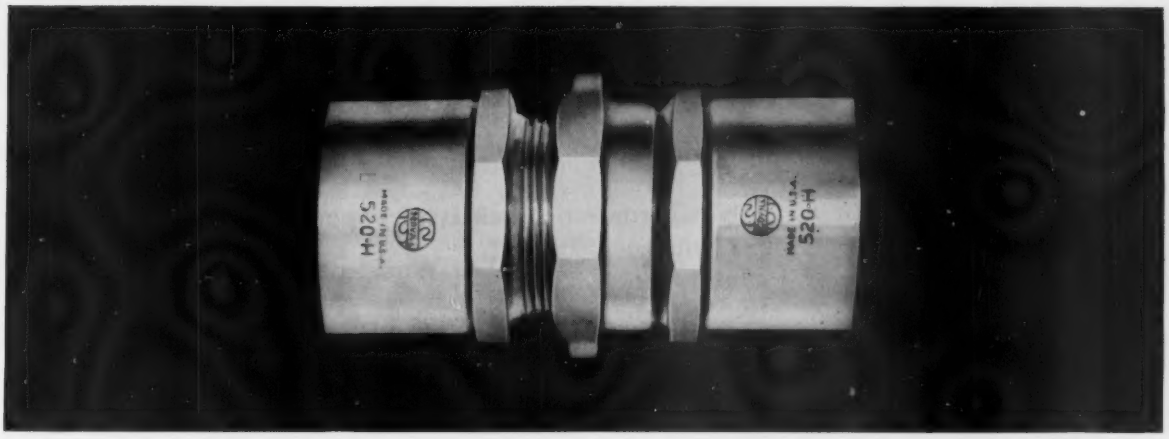
Although several of the materials currently being used in the building trade have been so employed for hundreds of years, the ones which are perhaps the oldest are ice and snow.

The chief proponents of the ice and snow "bungalow" have always been the Eskimos. While certain of their tribes have constructed winter homes of stone, chinked with moss and covered with ice and snow, others have relied entirely upon blocks cut from ice or packed snow. This has applied not only to individual houses, but also to community dwellings accomodating as many as 40 or 50 persons. Since this has been going on for at least as far back as the 14th Century, it would seem to indicate that such types of structures were adequate for the purposes intended. In fact, the Eskimos may even have been quite happy about the entire igloo situation.

Be that as it may, it seems no more than fair to report to all Eskimos listening—and anyone else interested—that the "great white brother," is making a project out of improving the technique of handling ice and snow for building purposes, (whether it needs it or not). According to a recent item in *Ind. and Eng. Chem.*, M.I.T.'s Ice Research Laboratory has developed ways to make stronger and more useful ice, which have "exciting possibilities." These involve the addition of 15 percent sawdust, which is said to triple the tensile strength of ice, or the use of 4 percent Fiberglass, which brings about a tenfold increase in the tensile. Also noted is the intriguing statement that a study is under way to see if processing with alcohols and other lubricating agents would make the ice grains fit together in a denser structure.

Just how all this upper strata scientific activity will affect the Eskimos is very questionable. My own unstudied opinion—based on the small number of intimate friends I have among these people—is that they will say "Ugh glub dub" (which being roughly translated; very roughly indeed) means, "We couldn't care less." But on second thought, maybe some of the younger members of the tribe will say, "Icky acky wacky," or, "Let's not be hasty, this subject may bear further investigation."

So, there you are! Proving that Science is active even in the frozen North; and that all Eskimos are not necessarily strong and silent, as reputed.



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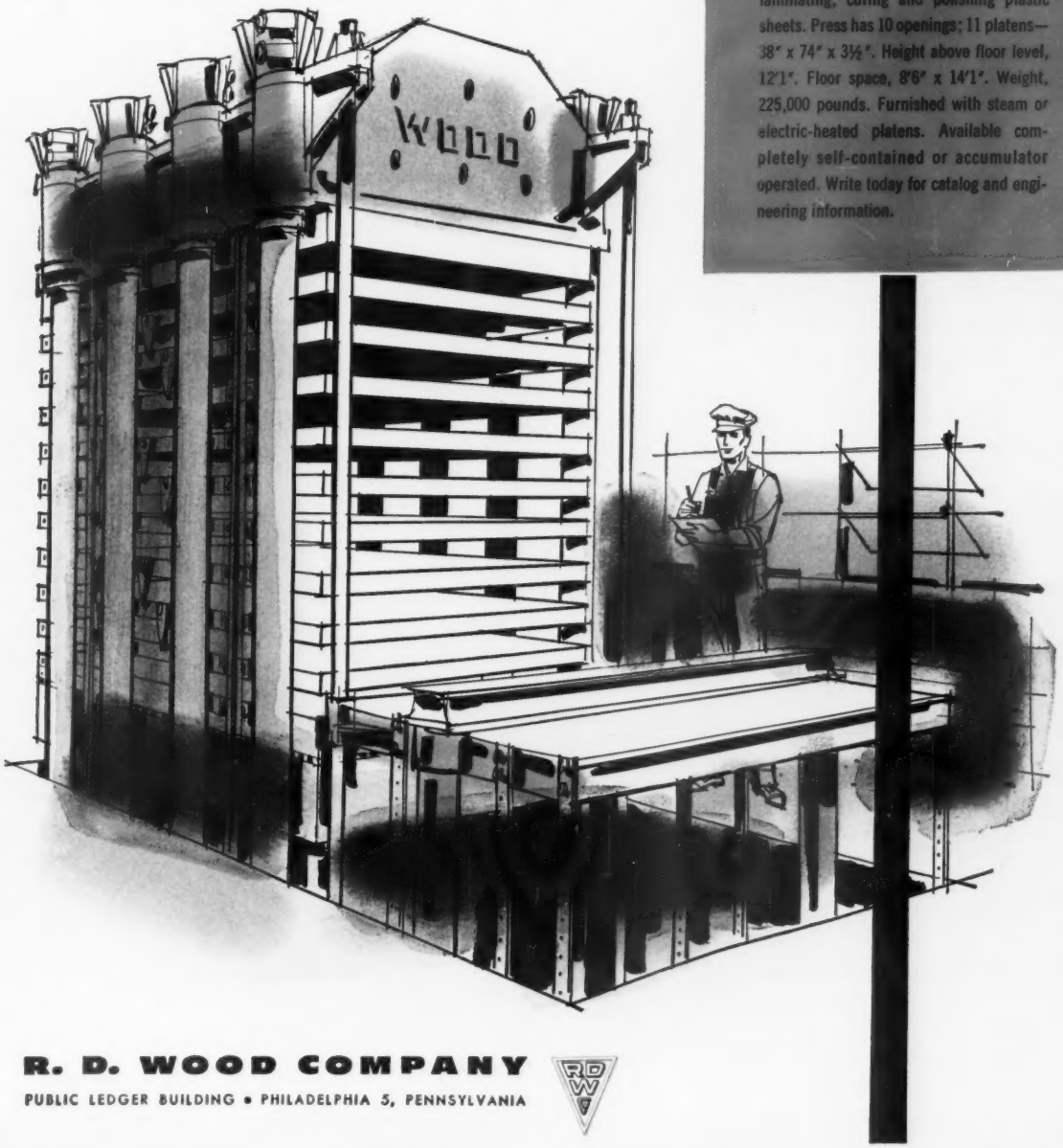

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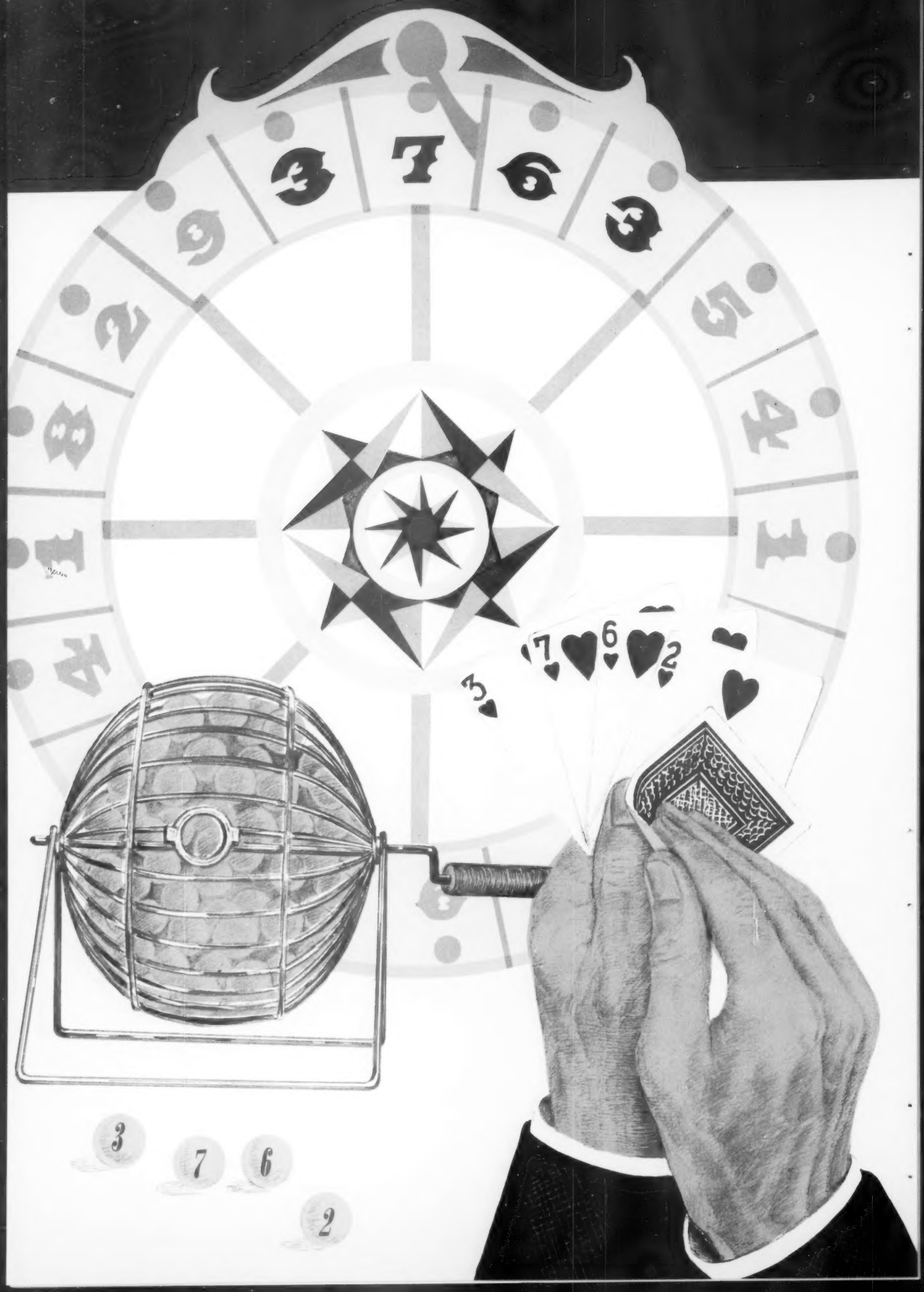
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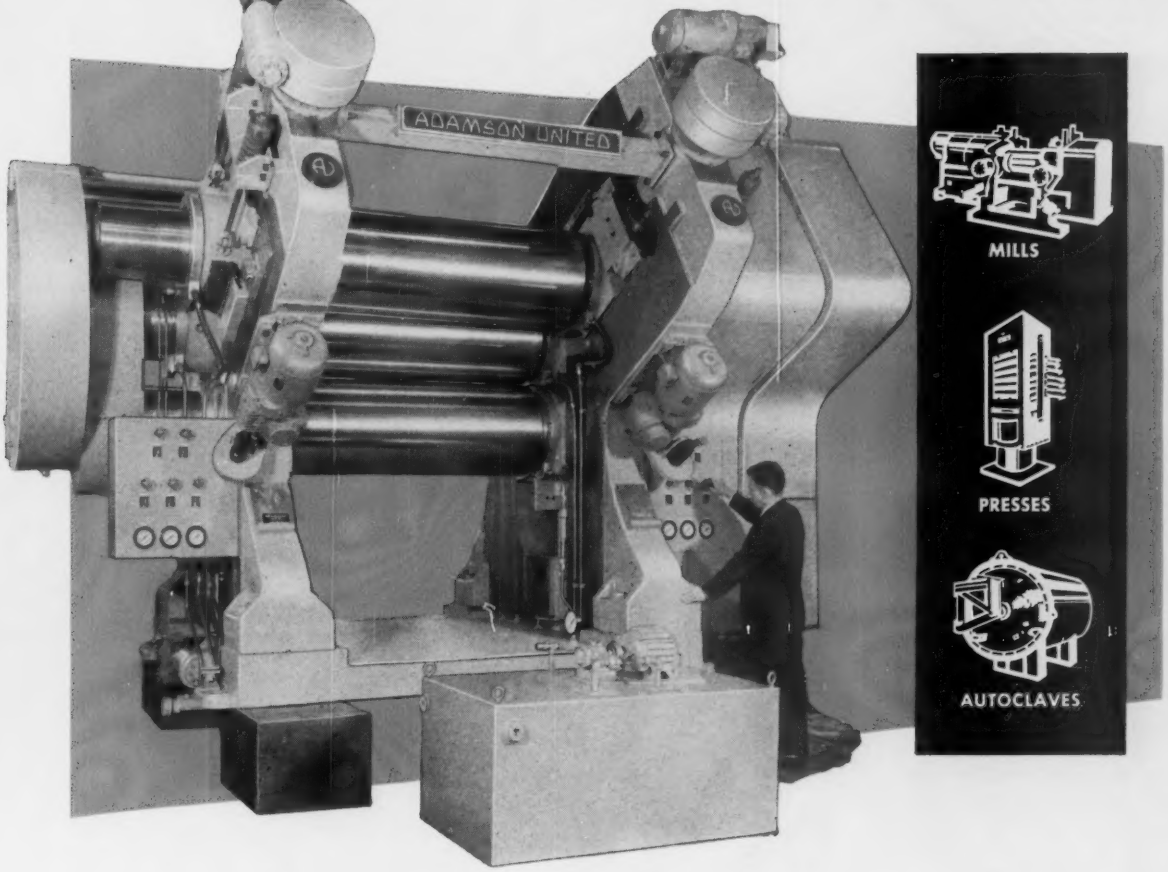

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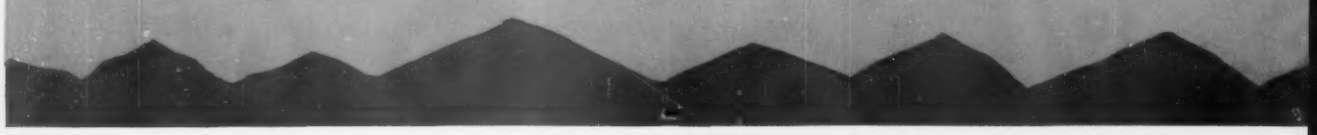

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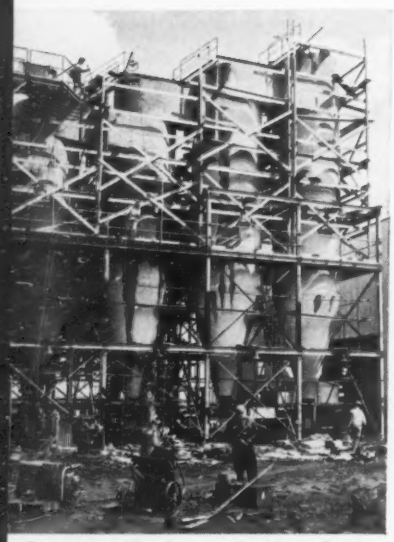
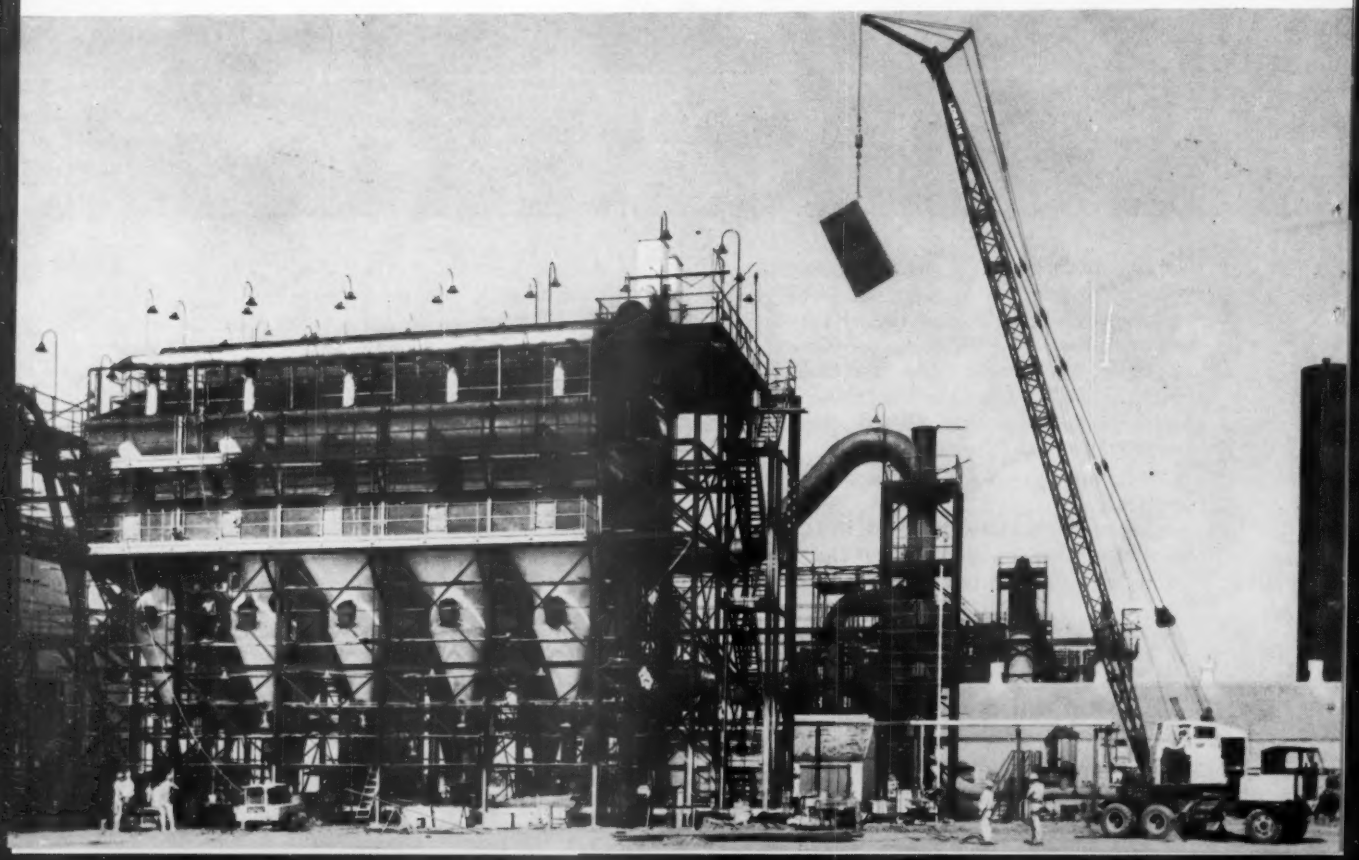


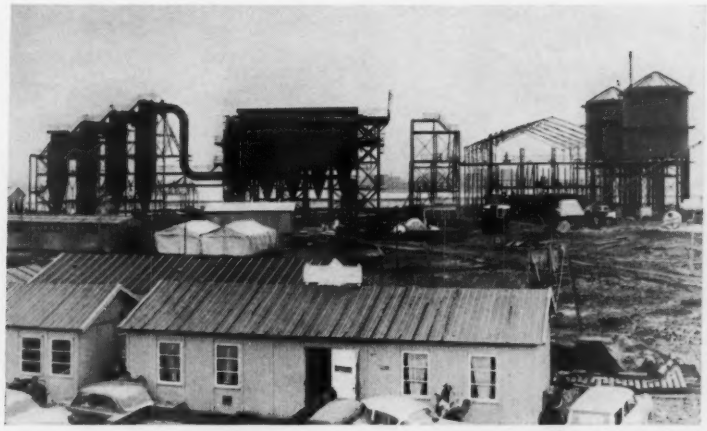
Louisiana: Newly completed production facilities for 25,000,000 lbs per year have just been brought on stream at Westlake to help meet the demand for premium quality carbon blacks.

The demand for quality carbon black by the rubber industry, both here and abroad, has reached a record-breaking level. And within the next few years, this demand is expected to increase even further. To keep pace with these carbon black requirements, Witco-Continental is engaged in a major expansion program to increase the Company's production capacity 50 per cent. New plants are being constructed in California, France and Italy, while a new plant in The Netherlands has now been completed. New additions also have recently been completed for present facilities in Oklahoma and Louisiana. Naturally, new laboratories are also being built to assure Witco-Continental customers the finest technical and other services.

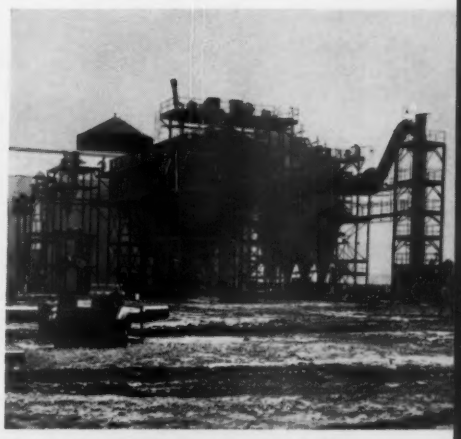
Oklahoma: The new facilities which were added to the Ponca City plant in 1959 increased production at this site by 25,000,000 lbs per year. This new addition has fully instrumented production controls as do all Witco-Continental plants.



CARBON BLACK DOLLAR at Witco-Continental



Europe: Steadily increasing demands for Witco-Continental carbon blacks have led the company to establish plants, laboratories, and sales offices on the Continent. A 30,000,000-lb-per-year plant has been completed at Rotterdam, The Netherlands. A 56,000,000-lb-per-year plant is under construction at Bordeaux, France, and a new 60,000,000-lb-per-year plant is under construction in Trecate, Italy.



California: The first carbon black plant ever to be built on the West Coast will be constructed by Witco-Continental. Located at Bakersfield, California, it will produce 30,000,000 lbs of oil furnace grade blacks per year. This photograph of the new oil furnace addition at Ponca City, Oklahoma is similar to the plant being constructed in California.

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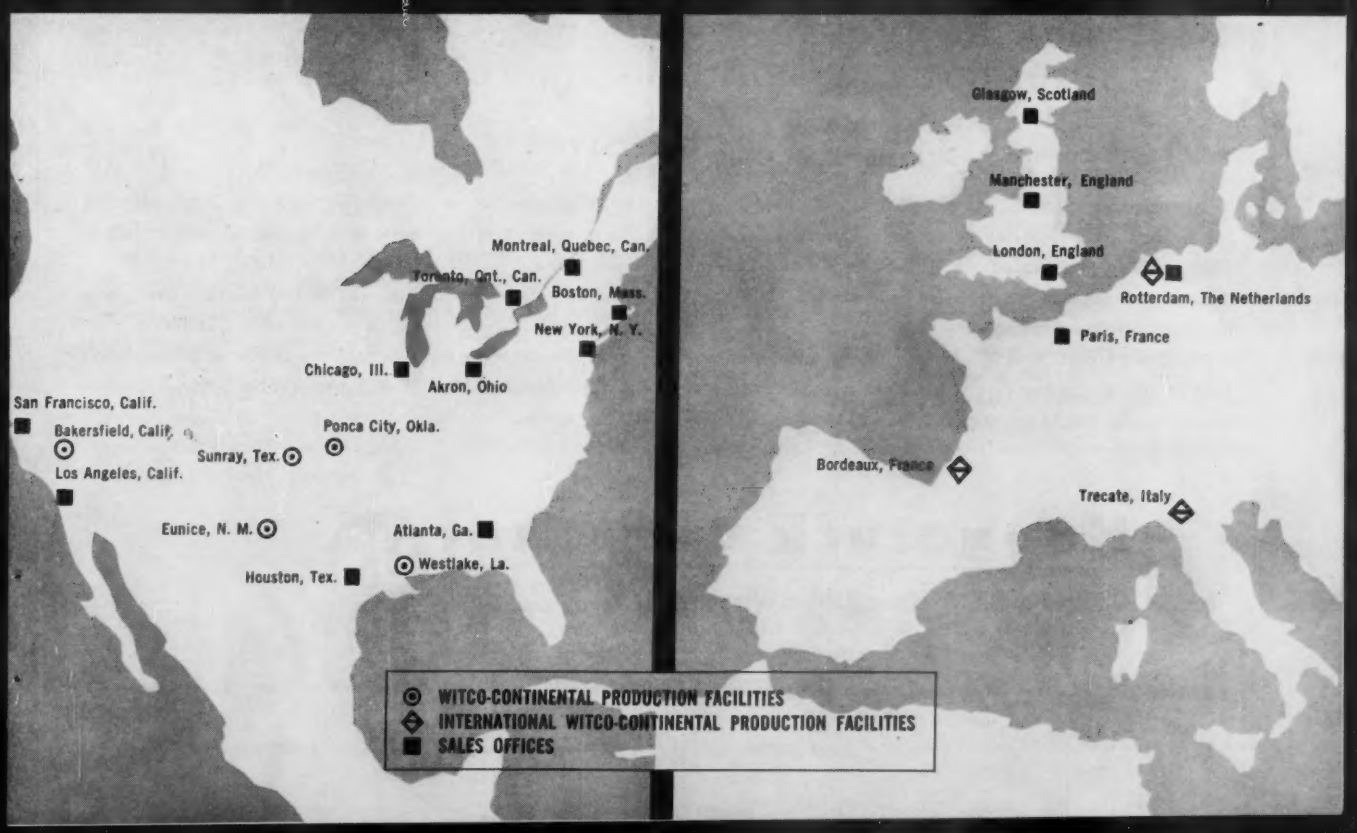

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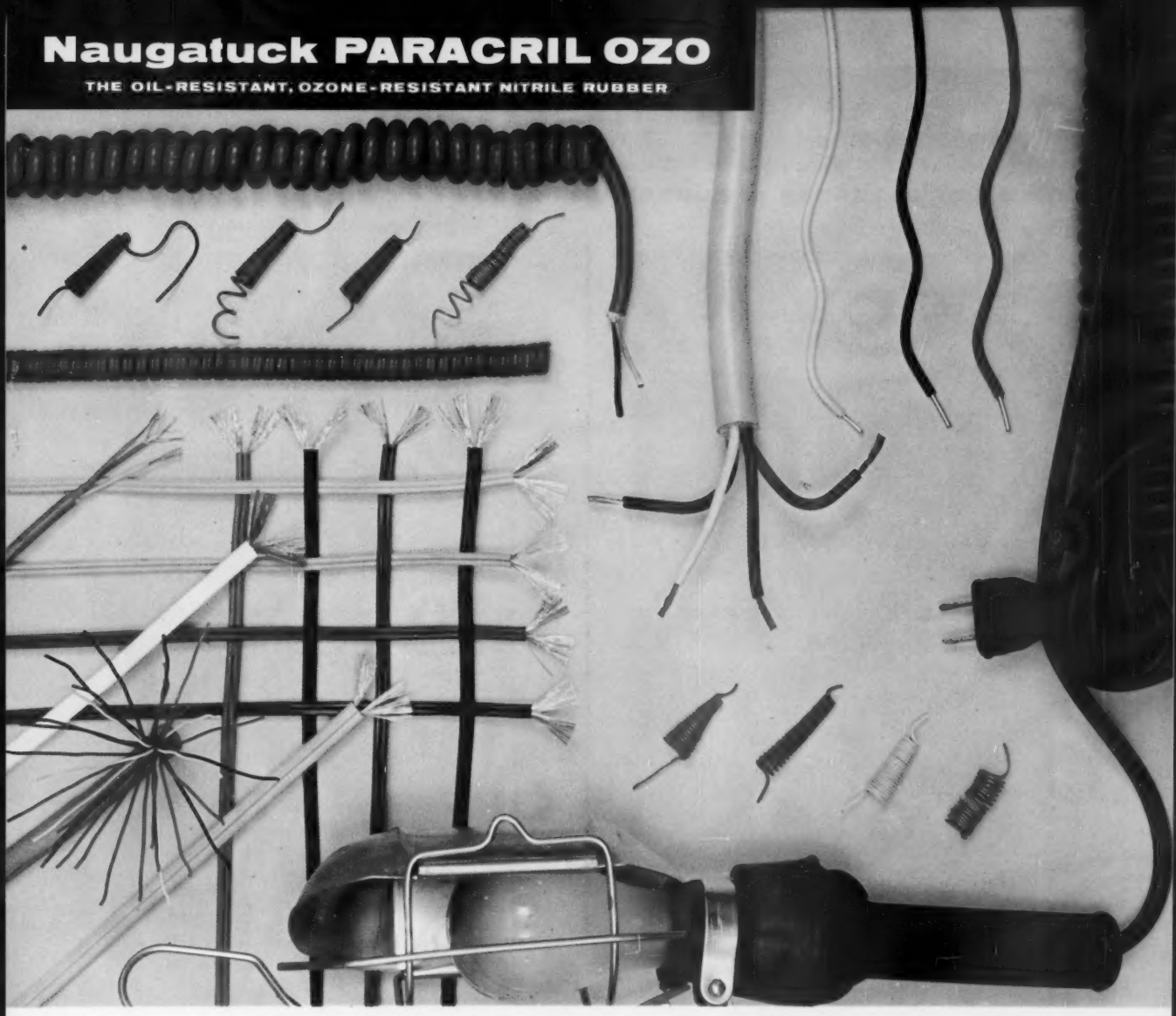

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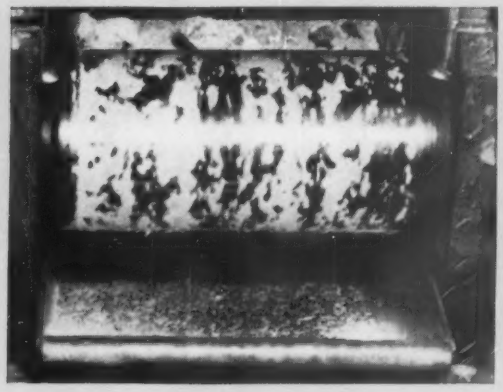

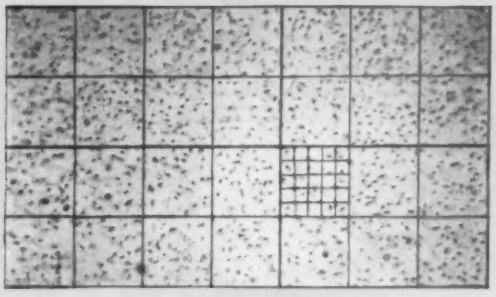

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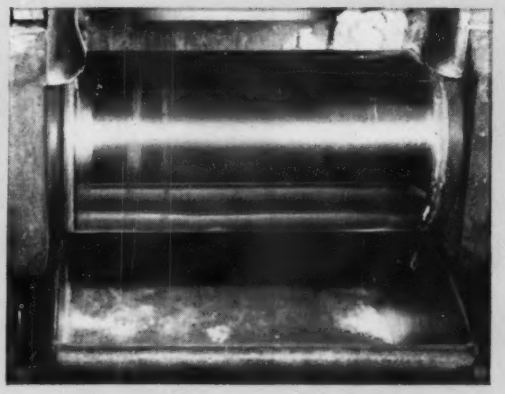

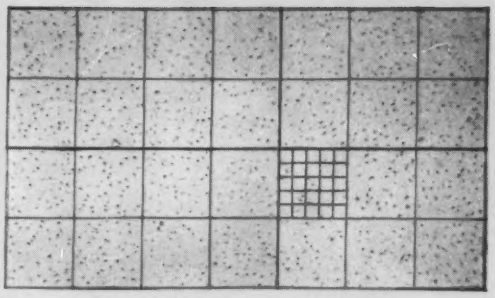

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# of Linear Polyethylene

By A. P. METZGER and C. W. HAMILTON
Battelle Memorial Institute
Columbus 1, Ohio

A method for measuring viscosity under simulated processing conditions

AS KNOWLEDGE OF the polymerization of olefins grows, the number of polymers available commercially increases at a bewildering rate. From this broad spectrum of olefin polymers, the processor must select the material which can be fabricated most readily to give a satisfactory product. That is, both the quality of the product and the processability of the polymer must be considered.

Density and melt index are the properties most often used for classifying polyethylenes. The density value is important because it is indicative of many other physical properties, for example stiffness and softening point. On the other hand, melt index, which is a measure of relative fluidity, is of only limited usefulness. It may even be misleading if polymers of similar melt index are compared on this basis alone. This is unfortunate since some criterion of the flow behavior is of primary importance to the processor.

The properties as well as the appearance of the product will, of course, be influenced by the processing technique. With experience, many physical properties can nonetheless be predicted with reasonable accuracy from density values. However, the ease of processing is more elusive, and there is no simple way to define this characteristic.

The processability of polymers is largely dependent on melt viscosity which, in turn, is a reflection of the molecular structure. Of course, the operating conditions, such as temperature and pressure, will also affect the viscosity. It is the purpose of this paper to discuss the limitations of certain commonly accepted test methods and to illustrate the differences that can be expected in the flow behavior of commercial high-density polyethylenes.

Factors Affecting Melt Viscosity

Polyethylene, like other thermoplastics, is processed and fabricated by the application of heat and pressure. An understanding of the rheological behavior of the molten polymer is necessary for evaluations of fabricating performance, as well as for designs of processing machines. Among molecular parameters which affect the melt flow of polymers, the molecular weight is perhaps most widely recognized. As the average molecular weight is increased, the melt viscosity is also increased. In fact, the logarithm of the viscosity at zero shear is a linear function of the square root of the average molecular weight *(1)*.

This relationship, however, is valid only for polymers prepared in the same manner. Thus, polyethylenes of the same average molecular weight prepared by different polymerization procedures may behave entirely differently in processing equipment, due to the influence of other molecular parameters on melt viscosity. The viscosity of long-chain linear polymers, for example, changes greatly with increases in shear stress. Polymers having a branched structure are more symmetrical and, therefore, less likely to orient when sheared. As a result, the branched polymers show less change in viscosity when sheared.

In addition to molecular weight and the amount of chain branching, another molecular parameter affecting melt viscosity is the molecular weight distribution.

Note: This paper was presented at the 16th Annual Technical Conference, Society of Plastics Engineers, Chicago, Ill., January 12-15, 1960.

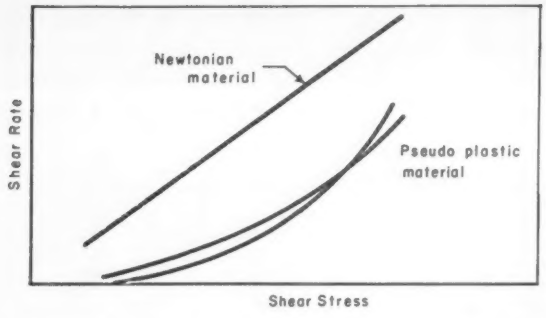

FIG. 1—Typical flow curves show the linear pattern for Newtonian liquids contrasted with the curves for non-Newtonian fluids.

It has been reported *(1)* that a sample with a broad distribution of molecular weight has a lower viscosity than a sample of similar weight—average molecular weight having a narrow distribution. In other words, the sample with a broad distribution has a larger, low molecular weight component acting as plasticizer.

Besides the effect of molecular weight on melt viscosity, the processability of the polymer depends also on such things as temperature, and die or mold geometry. The decrease of zero shear viscosity, with an increase in temperature, is well known. For a narrow temperature range, this relationship can usually be represented by an Arrhenius plot *(1, 2 and 3)*. The effect of die geometry on flow behavior has also been investigated *(4, 5 and 6)*, but the interrelationships of geometry, shear stress and molecular structure on viscosity are still not clearly understood.

Theoretical Aspects of Rheology

The theoretical aspects of polymer rheology have been covered by numerous articles *(3, 6, 7 and 8)* and need not be repeated in detail here. Nevertheless, an appreciation of certain fundamental differences in flow characteristics will lead to a better understanding of polymer behavior. In the simplest type of idealized flow, the shear rate bears a linear relationship to shear stress. Expressed in another way, this means that, if the amount of material flowing at a given temperature and pressure is known, the quantity flowing at the same temperature but at any other pressure can be predicted. The constant of proportionality between shear rate and shear stress is called the viscosity coefficient.

Fluids exhibiting this behavior are known as Newtonian liquids. Unfortunately, the flow behavior of most polymer-melts deviates from that simple relationship. Such more complex materials are called non-Newtonian fluids. Obviously, the ratio of shear rate to shear stress is not a constant in their case; that is, their viscosity changes. Determinations made at one set of conditions cannot be used for predicting values at other conditions. Ryder *(9)* gives data showing the effect of shear rate on the apparent viscosity of a linear polyethylene. Figure 1 illustrates these facts graphically.

Since the exact shape of the flow curves depends on the molecular structure of the polymer, it is evident that the curves for polyethylene made by different processes probably will not coincide and may even cross each other. Furthermore, flow rates measured at low shear stresses cannot be related easily to shear rates encountered at the high shear stresses of most commercial processing machines. It is then not surprising to find that melt index values have little significance. Data will be given later to illustrate this fact.

Viscosity of a dilute solution of the polymer is frequently used as an indication of its molecular weight. However, the solution viscosity is a function of the root-mean-square of sizes of the molecules in solution. The viscosity is dependent, therefore, on solvent efficiency and temperature, as well as on molecular length. Furthermore, it has been shown *(10)* that chain branching also affects solution viscosity, as would be expected. It is doubtful if any relationship between solution viscosity and molecular weight is valid for comparing polyethylene prepared by various processes and having different molecular weight distributions *(11)*. Thus, it is dangerous to place too much emphasis on solution viscosity measurements when comparing different polymers.

Need for High-Shear Measurements

From the above discussion it is evident that the processability of polyethylene made by different methods cannot be compared on the basis of melt index or solution viscosity. Also, it will be shown that some polymers prepared by different manufacturers, using essentially the same process, have different flow characteristics. To compare processability, it is necessary, in effect, to measure the flow properties at conditions which approach those encountered in processing equipment.

Various techniques have been used to measure flow rates at high shear stresses. Objects which are difficult to mold, such as a comb, have been used to compare polymers, as well as to study the effect of temperature and pressure on mold filling. In other work polymers have been given "moldability ratings" by studying their flow in a mold that incorporates a number of undesirable features, such as undercuts, ribs and thin sections *(12)*.

Another method of investigating flow behavior uses a continuous spiral cavity in the mold of an injection press *(13, 14 and 15)*. The length to which the plastic flows before freezing is an indication of its melt viscosity, and can be used to rate the materials. This technique possesses certain advantages, since it eliminates the problem of judging a "full" mold, and is applicable to a wide range of polymers.

Previous investigators *(13 and 14)* have supplied spiral flow data for comparing various types of polymers, such as nylon, vinyl copolymers, polyethylene and polystyrene. These data illustrate the large differences in flow behavior, and indicate the temperature sensitivity of such substances. The present work demonstrates that significant differences also exist in the

flow behavior of the various polyethylenes. Approximately 30 high-density polyethylenes were tested to obtain spiral flow data. Both injection molding and extrusion grades were represented.

In this study, a three-ounce injection press (Fellows Gear Shaper Co.) was equipped with a mold having an Archimedian spiral (half-round cross section, ¼-inch diameter, 90-inch length). The channel was scored at ½-inch intervals to permit direct measurement of the flow length. As is true in any injection molding operation, a number of variables had to be controlled in using this type of test mold. Feed setting, cycle time, ram pressure, mold temperature and melt temperature all were known to affect the length of the spiral. The procedure was essentially the same as that described by Griffiths *(13)*.

At each set of operating conditions, the feed was adjusted so that the plunger just failed to complete the full forward stroke. Thus, the feed was starved making just enough molten polymer available. This was important to obtain uniform packing. In setting the cycle, it was necessary to have time to: (1) Permit the plunger to move forward the maximum distance; (2) Let the material freeze in the mold; and (3) Allow for successive shots to be taken at uniform temperatures.

A 37-second cycle was selected to satisfy these requirements. Once the feed setting and time cycle had been established, it was necessary to determine the effect of varying ram pressure, mold temperature and polymer temperature. The line pressure was varied from 600 to 100 lb./sq.in., while holding the other variables constant. Over this range, the flow length was found to be essentially linear with respect to ram pressure.

Examination of the data in Figure 2 shows that the flow length of a typical, high-density polyethylene increases 30 to 60 per cent when the line pressure is increased from 600 to 1000 psi. Changing the mold temperature has a somewhat smaller effect. Mold temperature was varied from 100° to a maximum of 180° F. Over this range, the flow length increased in a linear fashion. The relationship for a typical polyethylene (Type 3) is shown in Figure 3.

As might be expected, the melt temperature has a greater influence on flow length than either ram pressure or mold temperature. Of somewhat more importance, the relationship between flow length and melt temperature is not linear. The flow-melt temperature curves are useful, since they not only illustrate the temperature sensitivity of the polymer, but also indicate practical molding limits. This range can

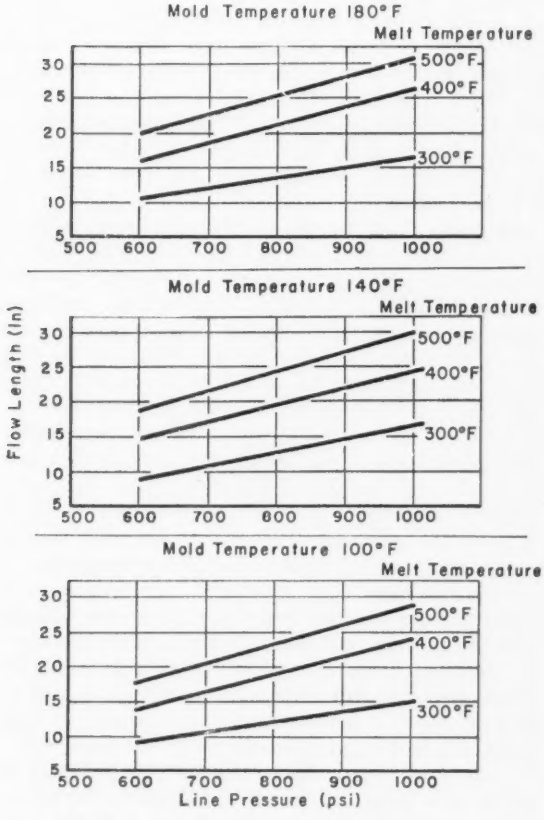

FIG. 2—Three charts show the effect of line pressure on flow length of typical, high-density polyethylene (Type III).

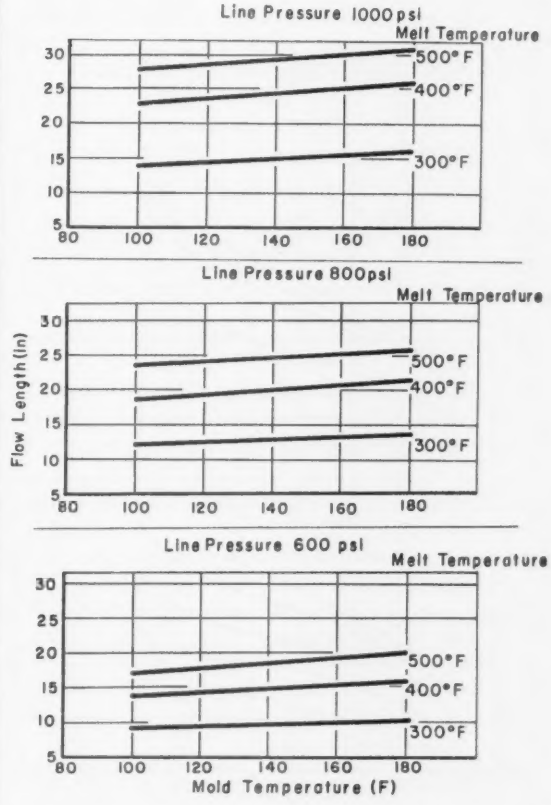

FIG. 3—Type III polyethylene behavior, this time indicating the effect of elevated mold temperatures on flow length.

be established, based on the temperature at which flow is very low and reaching its upper limit where decomposition and flashing become excessive. Spaak *(14)* lists confirmative data showing the effect of material temperature on flow rate, as measured in a melt index apparatus.

In the above discussion of processability, the importance of measuring flow behavior at high shear stresses has been pointed out. It is apparent, however, that for a practical evaluation, such as the spiral flow test, several factors must be considered. In order to simplify the task of comparing a large number of polymers, the ram pressure and mold temperature are usually held constant, only the effect of melt temperature being investigated. Thus, in most of the present work, the line pressure was maintained at 1,000 psi, with mold temperature kept constant at 150° F.

For a series of polyethylenes made by the same process by a single producer, the flow-temperature plots form a consistent family of curves, as shown in Figure 4. Similar plots were obtained for polymers from other manufacturers. It can be seen that polyethylene manufactured by either the Phillips process or with Ziegler catalysts manifests these same relationships. For comparison, a limited amount of data was obtained for conventional low-density polyethylenes. They appear to form a similar set of curves (Figure 5).

If the flow behavior of a polymer is known, it is then possible to predict how other polymers of that type from the same manufacturer will behave. However, it is important to note that differences in flow length are not as great as might be expected. Melt index values point up large viscosity differences.

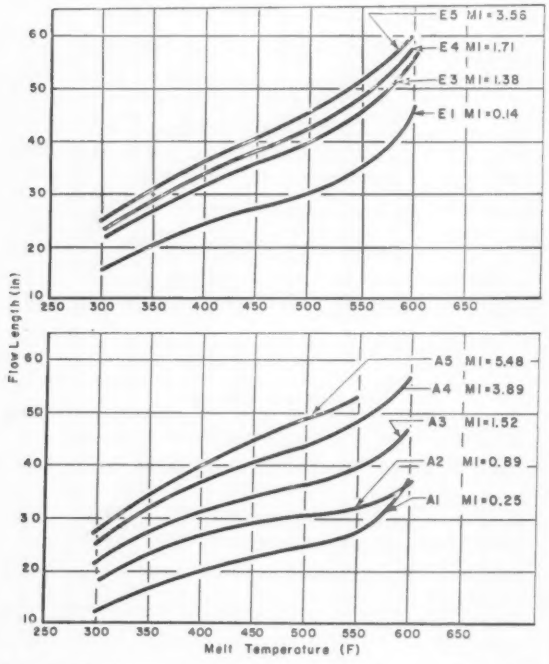

FIG. 4—Ziegler-type polyethylene contrasted with Phillips-type to show flow behavior differences within product families.

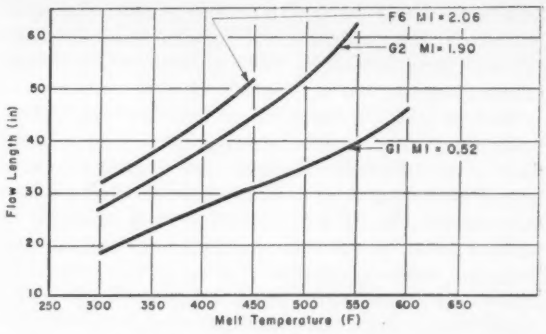

FIG. 5—Flow behavior of low-density polyethylene, presented for comparative purposes.

On the other hand, flow-length measurements indicate that only moderate increases in fluidity can be expected. For example, a polyethylene sample, E5, has a melt index (3.56) which is nearly 22 times as large as the index for another member of the same series, E1 (0.14). From Figure 4, it is evident nevertheless, that at a constant temperature (375° F.) flow length varies only by a factor of two. Similar relationships have been found for other polymer series.

If the flow behavior of polymers, having similar melt index values but made by different producers, are compared, it can be shown that in many cases significant variations in flow length occur. For example, as shown in the first graph of Figure 6, the flow length of two polymers with almost identical melt-index values varies by more than 40 per cent, at 375° F. The other two graphs of Figure 6 illustrate that polyethylene in other melt index ranges exhibits similar differences in flow length. Data for conventional, low-density polyethylene have been included in these graphs.

From the curves shown in the center panel of Figure 6, comparing a polymer made by the Phillips process with a polymer prepared by a Ziegler catalyst, variations are also shown to exist in flow behavior of polymers prepared by the same basic process. As shown in Figure 7, two polymers, prepared by different manufacturers using the same process, have different flow characteristics although their melt index values are nearly identical. Since some polyethylene of similar melt indices has variable flow behavior, it might be expected that other polymers with different melt index values would have the same kind of flow characteristics. Figure 8 shows such an example: flow data for ethylene-butene copolymer A-12.

From the preceding discussion, it is evident that in many cases the melt index value does not indicate how the polymer will flow in commercial machines. Furthermore, as shown previously, polymers from different producers will process differently. In Figure 9, data are given to demonstrate that a polymer of high molecular weight, as indicated by its low melt index, actually flows better than another polymer with a higher melt index. These findings illustrate the necessity of comparing flow characteristics at conditions approximating those of processing equipment.

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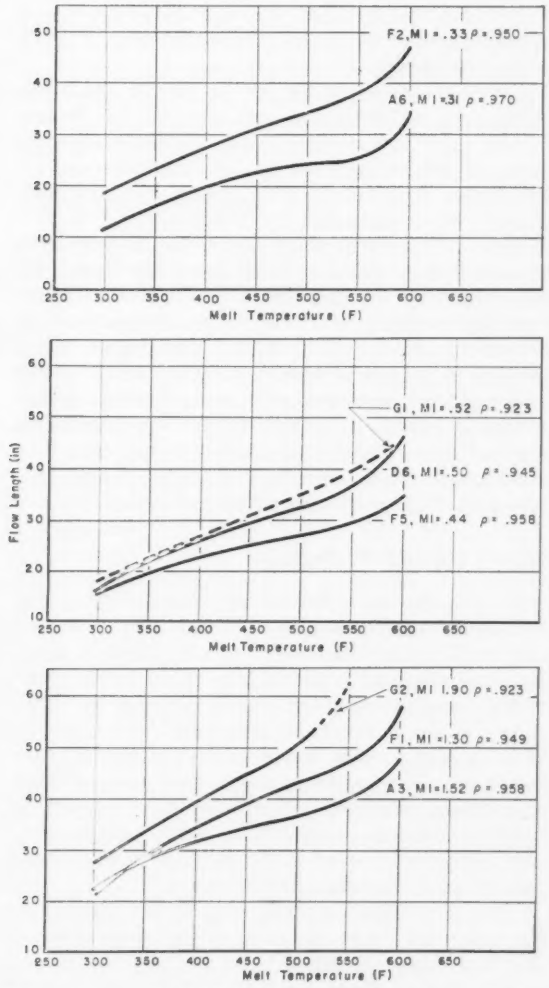

F2, MI = .33 ρ = .950
A6, MI = .31 ρ = .970
G1, MI = .52 ρ = .923
D6, MI = .50 ρ = .945
F5, MI = .44 ρ = .958
G2, MI 1.90 ρ = .923
F1, MI = 1.30 ρ = .949
A3, MI = 1.52 ρ = .958
Flow Length (in)
Melt Temperature (F)

FIG. 6—Three graphs highlight differences in flow behavior of polyethylene with similar melt indices (Phillips and Ziegler methods).

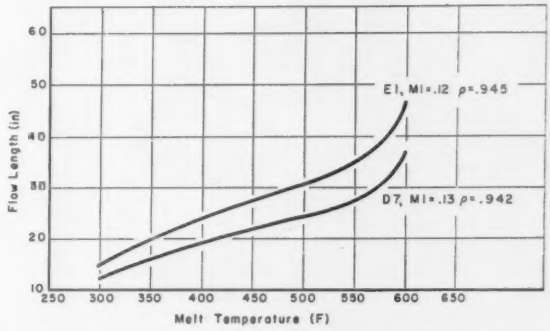


FIG. 7—Flow characteristics also differ for polymers from different manufacturers made by the same method, as indicated by this graph of high-density polyethylene with similar melt indices.

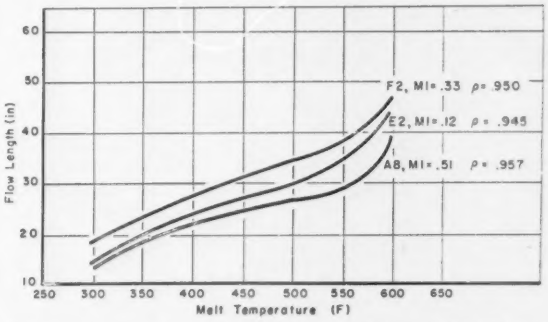


FIG. 8—An example of high-density polyethylene with different melt indices having the same type of flow behavior.

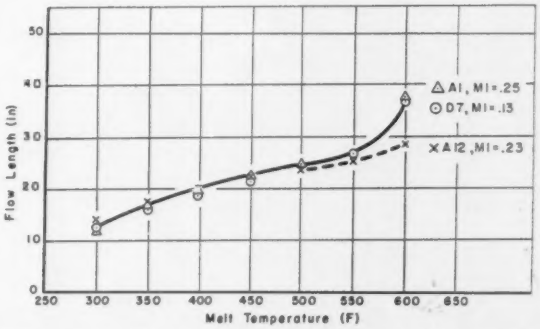


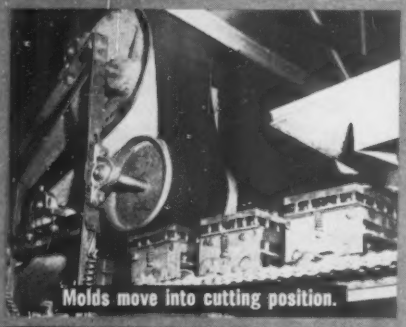
FIG. 9—A polyethylene with high melt index is shown actually to flow less than one with a lower index.

New Process Takes Just

90 SECONDS

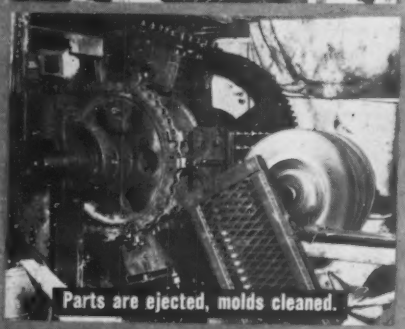
From Stock to Products

Stock enters strip-feed rolls.



Molds move into cutting position.

Male and female sections converge.



Parts are ejected, molds cleaned.

Product range: O-rings to rubber soles.

Automating

Yankee Ingenuity

—An exclusive

YANKEE INGENUITY is helping to solve automation problems in the manufacture of small, molded rubber parts for two Connecticut companies.

"Our new continuous molding process," said William F. Lang, manager of Bridgeport Fabrics' Rubber Division, during a recent interview, "is producing more at less cost. The fully automatic molding and vulcanizing machine we obtained about a year ago will manage to pay for itself in terms of reduced labor costs alone.

"Even more important for us is the machine's elimination of downtime and chances for human failure. The new process really combines six conventional production steps into one continuous operation—what is ordinarily done with a mill, calender, clicker, press, vulcanizer and trimmer."

This machine, supplied under a license from Molded Rubber Products Corp., Milford, Conn., was personally built by that firm's president, Donald F. Spengler, a man with nearly 30 years' experience in the rubber industry. It took him four years to carry the idea from its drawing board stage, through refinements and prototypes, to that of the finished model. A second, improved version has just been installed at Jacobs Rubber Division, Danielson, Conn. This time Mr. Spengler left machine-building to a subcontractor, Pootatuck Machinery Co., of Derby, Conn.

Taking a Cue from Tire Producers

As Mr. Spengler pointed out, the tire and tube makers, who process about 75 per cent of rubber consumed in the U.S., have not been slow to adopt the latest automation techniques. After taking stock of the obsolete equipment being used by the other sectors of the industry, he determined to correct the situation with his new device, under a currently pending patent. The molding machines are being offered, at a basic charge of about $30,000, tailored to specific production requirements. Only a single operator is required instead of the eight or so needed for conventional manufacturing methods.

The streamlined equipment at the Bridgeport Fabrics plant begins mixing rubber stock from a standard Banbury, then the new machine takes over. It first preheats the material to 150° F. in a warmup mill, next strip-feeds it into molds passing by on a

Production of Molded Goods

Leads Way to Continuous Vulcanization Breakthrough

RUBBER AGE Interview with a Persevering Inventor—

conveyor belt. The parts are molded and vulcanized at temperatures up to 350° F., while traveling past a double set of heating elements, and are finally ejected by plungers at the other end of the 3 x 18 foot device, where brushes clean the molds for reuse.

Three variables controlled by switches are: machine speed from 6 to 36 feet per minute, temperatures from 290° to 350° F., and molding pressures variable around 300 psi. The platen area of the molds is 6 x 6 inches, and up to 50 molds can be run at any one time. Compared with other automation equipment in the molded goods field, Mr. Spengler claims for his machine greater flexibility, economy and range of processing materials.

Quick Return on Investment

The sizes and thickness of products handled by the equipment range from minute O-rings to large rubber soles. Capital investment's proportion to product value is a remarkably low 20 per cent, using conservative estimates of $100,000 for the former and $500,000 as an average sales figure. Raw materials on which the machine has proved itself include neoprene, nitrile rubber, butadiene-styrene rubber and natural rubber. Mr. Spengler envisions adaptations to other materials, for example, reversal of the automated process to handle plastics through substitution of a refrigeration unit for the heating elements.

A special economy feature is offered by reducing flash of finished goods to a minimum. The molds, like cookie cutters, bite out only the proper quantity of strip-fed stock. The surplus is returned for reprocessing to the warm-up mill. The small amount of flash remaining on the product is removed afterwards in a liquid carbon dioxide bath by a subcontractor.

Speed and simplicity govern the operation. Mr. Spengler calculated that 2,000 rubber soles could be made each hour, based on a 1½-minute cycle and employment of fifty molds discharging 40 times an hour. Maximum output of smaller parts reaches astronomical proportions. From 25-cavity molds, for instance, O-rings would pour out at a rate of 400,000 per 8-hour shift. Preheating cuts down vulcanization time. Since the cure rate for small parts is faster at higher temperatures, increments in this range can be reached more quickly.

INVENTOR Donald F. Spengler shows holes in rubber stock, where parts were die-cut, to RUBBER AGE staff editor Harvey Fireside.

Mr. Spengler said that this speed factor was the major consideration influencing his choice of electric over steam heat. Current for the motor which drives the conveyor chain system is three-phase, either 220 or 440 volts. Modifications of the machine have been made since its inception to increase efficiency and adaptability. A more recent model has been designed for a horizontal run to equip it for production of rubber-covered metal inserts. Prototype molds have turned out a full line of electronic products, mechanical goods and automotive parts.

Showing It to the World

An early fascination with labor-saving equipment began for Mr. Spengler in 1934 when he helped launch the Ford Motor Company's first automated tire plant. He went on to become general manager of Sponge Rubber Products Co. in Derby, Conn., which led him to found his present firm in 1956. His long association with the industry has been recognized by the Connecticut Rubber Group. As past-chairman, he was accorded life membership. His current dream: To exhibit a working model of his invention at an international trade fair, so that other countries may see Yankee ingenuity in operation.

Development of a Low-Temperature ANTI-CHECKING WAX

PROJECT CHART
(1) Exposure testing of available anticheck waxes.
(2) Preparation of improved experimental compounds.
(3) Rigorous weathering of most promising material.
Result: Best waxes tested protect against ozone cracking. Effectiveness varies for different rubbers.

By S. W. FERRIS and J. S. SWEELEY
Sun Oil Company, Marcus Hook, Penna.

ALTHOUGH ozone-checking was once known as sun-checking, it is often more difficult to protect rubber from cracking at low temperatures than at high temperatures. This may be due to: (1) Slower migration of the wax to the surface of the rubber at low temperatures, or (2) Embrittlement and cracking of the wax film, resulting in ozone attack in localized areas.

It also appears that some compounds are more difficult to protect than others, at either high or low temperatures. The purpose of this investigation was to develop a wax particularly well suited for protecting rubber at low temperatures without sacrificing protection at high temperatures. First, a number of close-cut experimental wax fractions were examined. Then, selected fractions of commercially available wax were blended.

Selecting a Promising Compound

Exposure tests were carried out with a number of rubbers. Two of these, for weatherstripping, had the following formulations:

	Formula 1 (phr)	Formula 2 (phr)
Styrene rubber (hot)	100.0	25.0
Styrene rubber (cold)	—	75.0
ZnO	3.0	3.0
Antioxidant	—	1.0
Accelerators	2.65	1.3
FEF black	54.0	50.0
Softeners	2.0	28.7
Resin	19.3	—
Anti-scorching agent	0.5	—
Sulfur	2.0	1.7
Wax	5.0 or 10.0	5.0 or 10.0

Note: This paper was delivered in a symposium on antiozonants at the 1959 meeting of the Division of Rubber Chemistry, C.I.C.

Table I shows test results for 11 commercial anti-checking waxes using compounds with Formulas 1 and 2. With 10 phr of wax in Formula I, only one wax failed to protect in the ozone cabinet test at 120° F. None failed at 0° F. Outdoor exposure tests with 5 phr of wax in Formula 1 gave similar results: only one wax failed.

The behavior of Formula 2 was strikingly different. With 10 phr, six waxes did not protect in the 120°F cabinet test. All waxes were unsuccessful in cabinet tests at 0° F. Three of the waxes at 5 phr did, however, pass the winter outdoor exposure test, indicating that the ozone cabinet test at 0° F. is more rigorous than this particular series of outdoor exposures at Norwood, Penna.

Table I gives the melting point and refractive index for each wax. Attempting to correlate these properties with low-temperature performance is hardly worthwhile, since differences in formulation, apart from the wax, appear to be dominant. Formula 2 was selected for further work in developing a wax capable of eliminating ozone cracks under high and low-temperature ozone-test conditions, as well as under outdoor winter conditions.

In blending a wax to fill the requirements just given, it is desirable to know the anti-checking characteristics of some of the components of petroleum wax. Data were available summarized in a previous publi-

cation *(1)*, on 16 wax fractions that were relatively homogeneous in melting point, molecular weight, and hydrocarbon type. Each of these fractions had been used with Formula 3, a styrene rubber tire tread:

	Formula 3 (phr)
SBR (Cold)	100.0
Accelerator	1.25
ZnO	3.0
HAF black	50.0
Stearic acid	2.0
Softener	10.0
Sulfur	1.8
Wax	5.0

Looped specimens were tested in the chamber with 25 pphm ozone at 120° F. and at 0° F. They were also exposed outdoors for one year at Norwood, Penna.

Melting point and refractive index are properties which may conveniently be used to characterize waxes. This series of 16 wax fractions has been plotted in Figure 1, using these two properties. The ASTM D1171-58T rating for the exposure tests is noted beside the point for each wax.

The waxes on the left side of the figure are composed mainly of straight-chain paraffin hydrocarbons. Proceeding to the right, the structures become increasingly complex, with branched-chain and cyclic hydrocarbons predominating. The five fractions at the right of Figure 1 are residual or microcrystalline waxes. Both series of waxes increase in molecular weight with increases in melting point, but the five microcrystalline waxes on the right are higher in molecular weight than any of the paraffins.

Also noteworthy in Figure 1: (1) Waxes melting in the 100° to 121° F. range, whether paraffin or microcrystalline, give good protection in the 0° F. cabinet test, or in outdoor exposure. (2) Waxes melting above 160° F. were uniformly bad outdoors; in the cabinet, paraffin waxes were superior to microcrystalline waxes. (3) The best over-all performance was shown by paraffin waxes melting in the 140° to 150° F. range, although no single fraction was satisfactory under all three sets of conditions.

Blending Waxes for Laboratory Tests

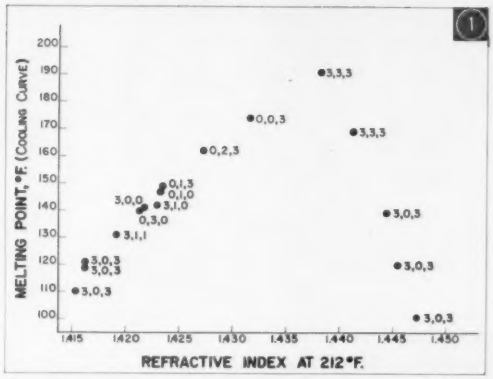
Guided by the indications with the sixteen narrow fractions, fourteen experimental waxes were prepared by blending commercial paraffin and microcrystalline waxes. These fourteen waxes were then added to Formula 2. Physical property data and test results are given in Table II.

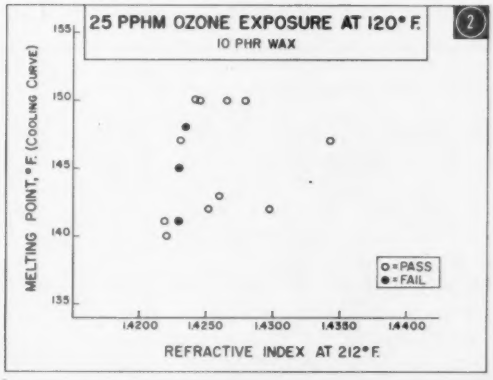
None of the 11 commercial anti-checking waxes used in selecting a compound, gave protection in all three tests with Formula 2. But, seven of the 14 experimental waxes did give "complete" protection at 10 phr. When these seven were tested at 7 phr, four gave perfect results.

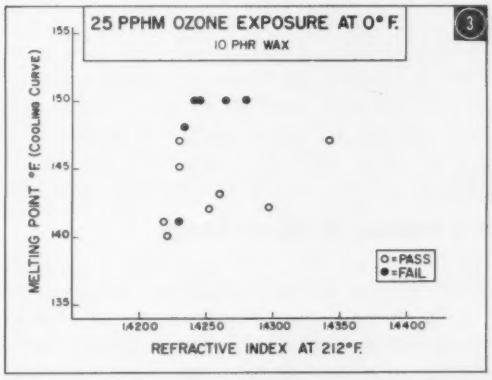
The data of Table 2 are plotted in Figures 2, 3 and 4. Only three waxes failed in the cabinet at 120° F., but six failed at 0° F. Three failed in winter exposure outdoors.

GRAPHS SHOW PERFORMANCE OF EXPERIMENTAL WAXES

(Figures 1-4, Described in Text)







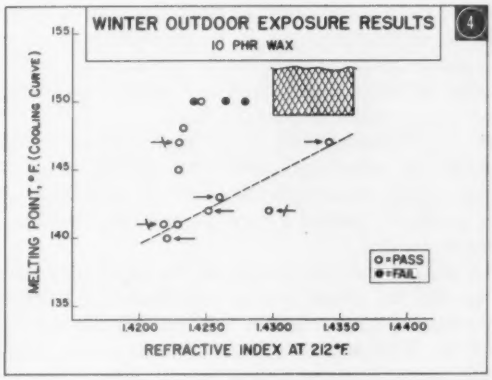


TABLE I—TEST RESULTS OF COMMERCIAL ANTICHECKING WAXES IN TWO FORMULATIONS

Commercial Wax	Melting Point* (° F.)	Refractive Index at 212° F.	ASTM Rating — Formula 1 — 10 phr Wax 25 pphm Ozone 120° F.	Formula 1 — 10 phr Wax 0° F.	Formula 1 — 5 phr Wax Outdoor Winter	Formula 2 — 10 phr Wax 25 pphm Ozone 120° F.	Formula 2 — 10 phr Wax 0° F.	Formula 2 — 5 phr Wax Outdoor Winter
A	166	1.4305	0	0	0	3	3	3
B	150	1.4341	0	0	0	1	3	3
C	144	1.4222	0	0	0	1	3	3
D	156	1.4293	0	0	0	0	3	0
E	153	1.4250	0	0	3	0	3	3
F	168	1.4294	2	0	0	3	3	3
G	152	1.4334	0	0	0	3	3	3
H	150	1.4254	0	0	0	2	3	3
I	155	1.4293	0	0	0	0	3	0
J	151	1.4302	0	0	0	0	3	0
K	150	1.4301	0	0	0	0	3	1
Total "Pass"			10	11	10	5	0	3
Total "Fail"			1	0	1	6	11	8

* The first marked deflection of the temperature-time cooling curve.

The arrows in Figure 4 indicate the seven waxes that gave complete protection at 10 phr. The diagonal line through the arrows links the three that failed at 7 phr. The four remaining points, representing waxes with a perfect score at 7 phr, fall close to the broken line.

These results do not agree with those of van Pul *(2)*, who found, with exceptions, that good waxes are characterized by melting points in the range 149° to 161.6° F., and refractive indices from 1.432 to 1.438. The temperature for refractive index was not given by van Pul, but it appears to have been about 200° F. Correcting to 212° F., the range of R.I. is 1.430 and 1.436. The satisfactory waxes, according to van Pul's data, would therefore fall in the shaded band in the upper corner of Figure 4, extended to 161.6. His work, however, was not particularly concerned with low-temperature protection.

Identical Properties, but Different Behavior

The four waxes that performed best, as plotted in Figure 4, all fall on the dotted line; but exceptions will probably be found. The three charts show that waxes of almost identical MP-RL relationship behave differently. This is to be expected, because neither of these properties indicates whether the wax is homogeneous or heterogenous in composition. If, therefore, waxes different from those used here were to be blended to fall on the broken line, their anti-checking performance might also be different.

We do not understand, at this time, the relationship between the refractive index and melting point for the particular waxes that fell on the broken lines, and their ability to protect a rubber compound with poor ozone-resistance.

To see whether the results of the laboratory could be applied to actual service conditions, a sidewall-exposure cracking test was initiated during the Fall of 1956. This was to compare, under severe winter conditions, experimental wax No. 12, one of the best according to the previous tests, with two commercial anti-checking waxes.

The rubber specimens were prepared in the laboratory of Polymer Corp. Ltd., at Sarnia, Canada, but arrangements were made for the test to be conducted at the University of Alberta, with university personnel making routine observations on a test tire prepared at Polymer Corp. and used under normal service conditions in and around Edmonton during the Winter of 1956-57.

The formula follows:

	Formula 4 (phr)
Polysar S	100.00
ZnO	3.00
Antioxidant	1.00
Accelerator	1.25
FEF black	30.00
SRF black	10.00
Softener	10.00
Stearic acid	2.00
Sulfur	2.00
Wax	As indicated

Procedure for Outdoor Tire Test

The preparation and mounting of sidewall strip specimens was conducted by the procedures previously published *(3)*. The test specimen consists of a tapered strip, .030-in. thick, varying in width from 1⅛-in. at the wide end (tire shoulder) to ¾-in. at the narrow end (tire rim). As mounted on the finished test tire, the narrow end of the specimen is gripped between the tire and the rim, the wide end is attached to the shoulder of the tire by means of a vulcanized cement (hot patch), and the large central area of the specimen is held by means of a cold patch rubber cement.

After they are mounted, the individual specimens are coated with a solution of vinylite, thus forming a film which protects the surface and prevents the formation of a wax bloom until the beginning of the exposure period. The vinylite films were removed

immediately prior to the shipment of the tire to the University of Alberta.

The samples were positioned so as to face outward during service. The tire (6.00 x 16) was mounted on the left front wheel of the test car, which was used in normal service, including daily transportation to and from the University. This type of intermittent service was considered desirable, since failure of a wax film would be most likely to occur when the car was started with cold tires.

During the 145 days of the test, from December 6, 1956 to May 1, 1957, the car travelled 3,600 miles. Observations were made at intervals of one week throughout the test period. The tire was removed from the car, taken to the laboratory and cleaned with a damp cloth. The specimens were examined for cracking using a seven-power magnifying glass. Where cracks were present, the length of the longest cracks was recorded to the nearest 0.01-in. Daily temperature observations for the period from December 7 to March 28 are shown in Table III. Several periods of subzero weather occurred during the winter months.

Protection From Ozone Cracking

Table IV shows the protective waxes added to the base recipe; stress-strain and hardness data, and number of days to the first observation of cracking. Following the test, the tire was shipped to Sarnia for final inspection. This inspection confirmed the observations reported from Alberta with respect to extent and severity of cracking.

On the basis of previous summer tests with this formula, conducted during summer months at Sarnia, the conditions, with respect to ozone cracking, were surprisingly mild. Nevertheless, the superiority of the experimental wax is unmistakable.

Wax L gave no substantial protection at 1 and 2 parts; fair protection at 3 parts. With Wax M this trend was reversed: Slight protection at 1 and 2 parts, but no more than the blank without wax at 3 parts. The specimens containing the experimental wax at 1, 2 or 3 parts all gave full protection throughout the test.

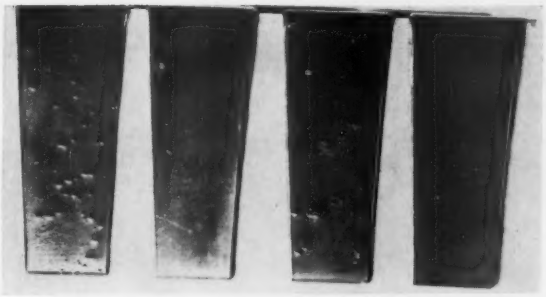


FIG. 5—Four tire test strips photographed after 238 days of hot and cold weather exposure, (left to right): control, Wax L, Wax M and Experimental Wax No. 12, the latter three compounded at 3 phr.

These tests were continued into the summer months with still no failure of the experimental wax. Protection was thus obtained under both hot and cold weather conditions. Figure 5 shows four test strips at the end of 238 days; the control, and the strips containing 3 parts of each of the anti-checking waxes. The anomalous results for Wax L at 3 parts continued throughout the test. Although checking occurred, it was not severe enough to show up in the photograph.

Summary of Methods and Conclusions

To develop a low-temperature anti-checking wax, this work included three major steps. First, exposure tests were carried out with a number of rubbers, and it was found that one of these was not protected at low temperatures by any of 11 commercial anti-checking waxes.

Next, working with that rubber, and utilizing information obtained on close-cut experimental waxes, blended waxes were prepared, several of which did

TABLE II—PHYSICAL DATA AND TEST RESULTS OF EXPERIMENTAL WAXES

Experimental Wax	Melting Point (° F.)	Refractive Index at 212° F.	ASTM Rating Formula 2 — 10 phr Wax 25 pphm Ozone 120° F.	10 phr Wax Ozone 0° F.	10 phr Wax Outdoor Winter	7 phr Wax 25 pphm Ozone 120° F.	7 phr Wax Ozone 0° F.	7 phr Wax Outdoor Winter
No. 1	150	1.4255	0	3	0	—	—	—
No. 2	149	1.4277	0	3	3	—	—	—
No. 3	147	1.4242	0	0	0	0	3	0
No. 4	148	1.4245	1	2	0	—	—	—
No. 5	150	1.4249	0	3	1	—	—	—
No. 6	145	1.4247	1	0	0	—	—	—
No. 7	142	1.4231	1	3	0	—	—	—
No. 8	153	1.4293	0	3	3	—	—	—
No. 9	142	1.4228	0	0	0	3	1	0
No. 10	138	1.4220	0	0	0	0	0	0
No. 11	142	1.4266	0	0	0	0	0	0
No. 12	145	1.4272	0	0	0	0	0	0
No. 13	146	1.4360	0	0	0	0	0	0
No. 14	137	1.4310	0	0	0	3	0	0

TABLE III—TEMPERATURE DATA (° F.) FOR OUTDOOR EXPOSURE OF TEST TIRE (WINTER 1956-57)

Date	High	Low	Date	High	Low	Date	High	Low	Date	High	Low
Dec. 7	+7	—19	Jan. 4	+21	+3	Feb. 1	+7	—19	Mar. 1	+40	+12
8	+8	—6	5	+28	+14	2	+21	—7	2	+38	+13
9	+5	—4	6	+32	+19	3	+16	+8	3	+29	+13
10	+3	—2	7	+9	—8	4	+9	+1	4	+6	—8
11	—8	—20	8	—11	—18	5	+9	—12	5	+40	—4
12	—3	—20	9	—5	—19	6	+11	—13	6	+19	—7
13	+1	—9	10	—6	—19	7	+25	—1	7	+23	+7
14	—1	—4	11	—8	—21	8	+22	+5	8	+29	+3
15	+4	—15	12	—2	—19	9	+27	+8	9	+26	+14
16	—1	—15	13	+17	—19	10	+30	+12	10	+26	+21
17	+22	—0	14	+6	—8	11	+36	+16	11	+34	+5
18	+39	+11	15	+14	—6	12	+32	+18	12	+27	—1
19	+35	+20	16	+30	+4	13	+41	+24	13	+22	—5
20	+41	+28	17	+34	+14	14	+41	+25	14	+20	—5
21	+31	+15	18	+25	+5	15	+30	+15	15	+26	+4
22	+27	+3	19	+22	+15	16	+45	+21	16	+28	+17
23	+32	+15	20	+9	+3	17	+22	+11	17	+31	+10
24	+39	+19	21	+8	—6	18	+13	+6	18	+43	+21
25	+46	+33	22	—4	—17	19	—7	—17	19	+49	+29
26	+46	+33	23	—5	—20	20	+3	—23	20	+41	+32
27	+45	+38	24	—8	—21	21	—12	—22	21	+37	+32
28	+51	+32	25	+12	—21	22	—3	—23	22	+39	+24
29	+46	+33	26	+23	—7	23	—7	—13	23	+46	+9
30	+38	+32	27	+26	+14	24	+6	—10	24	+45	+25
31	+34	+22	28	+16	+4	25	+10	—20	25	+41	+30
Jan. 1	+29	+21	29	+24	+7	26	+22	—2	26	+40	+28
2	+23	+12	30	+17	+10	27	+4	+17	27	+39	+23
3	+17	+6	31	+7	+1	28	+38	+16	28	+43	+25

protect the rubber in ozone cabinet and outdoor tests. Finally, one of these waxes was used in a rubber compound subjected to a sidewall cracking test, which was started under severe winter conditions and extended into the summer months. No ozone cracking was observed.

This investigation confirms the difficulty of predicting outdoor results from ozone cabinet tests. It also proves that some rubbers are much more difficult to protect than others.

The four best waxes tested showed a definite correlation between melting point and refractive index at 212° F.

ACKNOWLEDGEMENT

The authors wish to acknowledge the cooperation of Polymer Corporation, Sarnia, Ontario, Canada, particularly that of E. B. Storey and D. C. Edwards, in releasing their report on the tire test of one of the experimental waxes. This work was considerably enhanced by the detailed temperature record and sample examination carried out by personnel at the University of Alberta.

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(2) Van Pul, B.I.C.F., *Rubber Chem. and Tech.*, Vol. 31, p. 866 (1958).

(3) Edwards, D. C., and Storey, E. B., *Rubber Age*, Vol. 79, p. 787 (1956).

TABLE IV—PHYSICAL PROPERTIES AND EXPOSURE TEST RESULTS OF POLYSAR S WITH ANTI-CHECKING WAXES

Compound 33M	279*	280	281	282
Commercial Antichecking Wax L (phr)	—	1	2	3
Tensile Strength (psi)	2040	2050	2030	2245
Elongation at break (%)	640	480	490	500
Modulus at 300% (psi)	1160	1160	1095	1075
Shore A-2 Hardness	46	43	44	43
Days to First Crack	42	42	49	175

Compound 33M	297	298	299
Commercial Antichecking Wax M (phr)	1	2	3
Tensile Strength (psi)	1965	2060	2280
Elongation at break (%)	470	520	580
Modulus at 300% (psi)	1160	1045	1030
Shore A-2 Hardness	45	43	42
Days to First Crack	63	56	42

Compound 33M	305	306	307
Experimental Wax No. 12 (phr)	1	2	3
Tensile Strength (psi)	2110	2100	2025
Elongation at Break (%)	510	500	500
Modulus at 300% (psi)	1120	1120	1080
Shore A-2 Hardness	46	46	45
Days to First Crack	none observed		

* Contains no antioxidant or wax.

A HIGH-SPEED PRESS FOR PRECISION PARTS

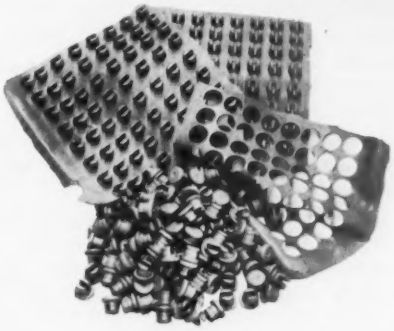
PRECISION rubber stopples, used as seals on antibiotic pharmaceuticals, are produced at a rate of 100,000 per day at the Ashland, Ohio, plant of the Faultless Rubber Company, by means of a new 35-ton hydraulic press. The manually controlled machine turns out stopples, as well as air-tight seals for hypodermics and other medical products, of remarkably uniform quality through pinpoint pressure control linked to its hydraulic system.

Double action of the press ram permits the operator to obtain trimming pressure in the first operation, then to force trimmed stopples through the drilled die bed in a second ram action without damage to goods. Stopples are trimmed from cured natural or synthetic rubber "heats" or pads, formed in molding and curing presses in the plant area. Several heats, containing several hundred stopples each, are then placed in the die of the press.

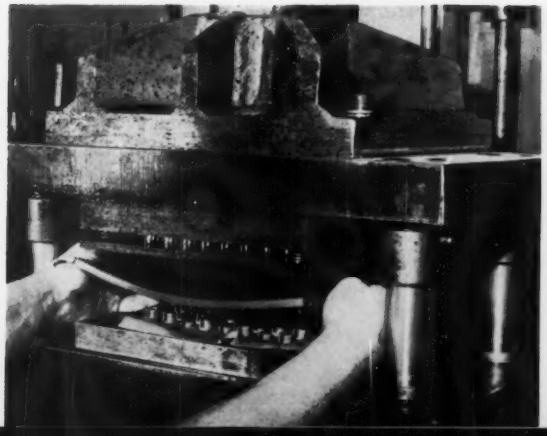
Mats are stacked beside the press in a tub containing a lubricant. The operator removes a mat from the tub and places it in position on the drilled die bed. The press cycle is actuated by two levers at either side of the press. Pressure must be exerted simultaneously on both levers, providing a built-in safety factor for the operator. As the ram closes, it trips a stop collar on the left shipper rod, then builds up to full pressure setting on the relief valve. When this is reached, cutting dies descend into holes in the perforated die bed, squeezing stopples from the mat.

▲ "Heats" are hand-fed to 35-ton hydraulic press for first step in stopple making.

Before and after trimming step: ▶ stopples adhering to heats and trimmed for use.



Operator positions rubber pad to prepare press for die plate ejection of product. ▼



Next, a rubber pad is placed above the stopples in the die bed. The operator reactivates the press ram, but eases up on the pressure before the stop collar is tripped, allowing the ram to descend only on the differential pressure in the system. This provides sufficient force against the rubber pad to force the stopples through the drilled die bed, without recutting or scarring stopples. Stopples fall into a trough underneath the press tooling, are gravity-fed to a product bin, flash is removed by the operator, and the press is ready for the next cycle.

The Faultless Rubber Company is using other 4, 6 and 8-ton "Multipresses," also made by Denison Engineering, Columbus, Ohio, in the manufacture of pharmaceutical rubber products.

RUBBER DIVISION

MEETING N.Y.C., SEPT. 14-16

THE 78th meeting of the Division of Rubber Chemistry of the American Chemical Society, will be held on September 14, 15 and 16, at the Commodore Hotel in New York, N. Y. The three-day meeting will feature the presentation of 28 technical papers and two invited papers. The luncheon of the 25-Year Club, a business meeting and a "liaison breakfast" have also been scheduled for this program.

The technical portion of the meeting has been divided into four sessions. The first of these, concerned with new polymers, will be held on Wednesday afternoon, September 14, with Division Chairman W. J. Sparks (Esso Research) presiding. On Thursday morning, September 15, the second session, beginning with a group of five papers on rubber reinforcement, will be held under the chairmanship of J. Rehner (Esso Research). The vice-chairman of the Rubber Division, W. S. Coe, (U. S. Rubber), will preside over the third technical session embracing rubber chemistry, which is scheduled for the afternoon of Thursday, September 15. The final technical session, devoted to papers of general interest, will be held on Friday morning, September 16, with past-chairman E. H. Krismann (DuPont) presiding.

The first of two invited papers will be presented at 2:10 P.M. on Wednesday, September 14. At this time, Professor Maurice Morton, Director of the Institute of Rubber Research at the University of Akron, Akron, Ohio, will speak on "Recent Developments in Anionic Polymerization." Professor Morton is an international authority on polymer chemistry.

The second invited paper will be presented at 2:00 P.M. on Thursday afternoon, September 15, by Professor C. S. Marvel of the University of Illinois, Urbana, Ill. Professor Marvel, a specialist in elastomer research, will speak on "Recent Developments in High-Temperature Rubbers."

A special feature of the program is the set of papers to be offered Thursday morning, September 15, in the form of a symposium on rubber reinforcement. The series has been especially arranged to cover various aspects of this subject, four of the speakers dealing with carbon black's contribution and one with silica's enhancement of physical properties. The paper by A. M. Gessler (Esso Research) on "Attrited Carbon Blacks and Their Behavior in Elastomers" constitutes the third part of his articles about these reinforcing agents, currently appearing in RUBBER AGE. This talk is scheduled to be published as his concluding installment in the September issue.

Abstracts of the technical papers, that will be delivered at the meeting, follow:

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Commodore Hotel, New York, N. Y.
Sept. 14-16, 1960

Wednesday Morning — Sept. 14

9:00 A.M.—Registration.
11:30 A.M.—Twenty-Five Year Club Luncheon, J. M. Ball, Chairman.

Wednesday Afternoon — Sept. 14

2:00 P.M.—Technical Session.

Thursday Morning — Sept. 15

9:00 A.M.—Technical Session.
11:45 A.M.—Business Meeting.

Thursday Afternoon — Sept. 15

2:00 P.M.—Technical Session.

Thursday Evening — Sept. 15

6:00 P.M.—Suppliers' Cocktail Party.
7:30 P.M.—Divisional Banquet.

Friday Morning — Sept. 16

8:00 A.M.—Liaison Breakfast, W. S. Coe, Chairman.
9:30 A.M.—Technical Session.

Wednesday Afternoon—Sept. 14

"New Polymers"

W. J. Sparks, Presiding

2:00 P.M.—1—Introductory Remarks. ***W. J. Sparks, Chairman.***

2:10 P.M.—2—Recent Developments in Anionic Polymerization. ***Maurice Morton (University of Akron, Akron, Ohio).***

The recent growth in the applications of anionic polymerization for the synthesis of new polymers has been largely due to new knowledge which has become available about these systems.

The two outstanding features exhibited by the reaction of carbanions with unsaturated monomers are stereospecificity and absence of chain termination. The former has made it possible to synthesize polymers having regulated chain structure, e.g. *cis*-polyisoprene, through the use of the Ziegler-Natta type catalysts or lithium compounds. The latter has resulted in a very high degree of control over the molecular weight distribution of these polymers. Hence it has been possible to attain the twin objectives of control of chain structure and molecular size to a greater extent than ever before.

The mechanism which is responsible for these features apparently differs sharply from that of free radical and carbonium ion polymerizations. The homogeneous anionic

polymerizations are considered to proceed through successive additions of monomer units to an ion pair, which may not undergo any real termination step. Hence the polymerizing chains continue to grow as long as any monomer is present. Furthermore, such ion pairs, whether in homogeneous solution or at a solid-liquid interface, may be very specific toward the steric conformation of incoming monomer units.

2:50 P.M.—3—Ethylene-Propylene Rubber. ***L. O. Amberg and A. E. Robinson (Hercules Powder Co., Wilmington, Del.). (Paper will be presented by Mr. Amberg.)***

Copolymers of ethylene and propylene can be prepared over a wide range of composition and molecular weight. They vary in properties from tough, semirigid materials through typical elastomeric rubbers to balsamic gums. The elastomers containing 60 to 70 mole per cent ethylene process like conventional rubbers, are relatively easy to cure with peroxides, and have good vulcanizate properties. Those with preferred molecular weights have reduced specific viscosities of 3 to 4 (0.1% in Decalin at 275°F.) and Mooney viscosities (ML-4, 212°F.) of 30 to 45. These polymers are believed to have an amorphous linear structure substantially free of long-chain branching and residual unsaturation. Best properties appear to result from narrow molecular weight distribution and high uniformity of composition. Specific gravity of the copolymer is about 0.87.

Ethylene-propylene rubber, being a saturated hydrocarbon, is inherently stable chemically. Heat resistance of its vulcanizates is good, and it is many times more ozone- and weather-resistant than nitrile rubber, SBR, and natural rubber, and considerably better than butyl rubber. Tensile properties are in the SBR range but tear strength is about 70% of SBR. Preliminary data from other laboratories indicate that wear and abrasion properties are good in comparison with SBR and natural rubber. Building tack is poor at room temperature.

Ethylene—propylene copolymers do not break down readily under shear or with peptizers. Consequently, a somewhat lower raw polymer viscosity is needed compared with SBR for equivalent compound processability. Otherwise, they process much like SBR, but need more tackifier. Bonds to butyl are fairly good. With SBR and natural rubber a tie gum layer is needed to resist relamination on flexing thick sections as in tire treads.

Ethylene—propylene copolymers require a free-radical curing agent such as dicumyl peroxide (Hercules Di-cup). A small amount of sulfur improves the cure. Pigment reinforcement occurs as with SBR. Choice of pigments, plasticizers, and other accessory materials is governed by the chemistry of the free-radical curing agent. Oil extension of high viscosity polymer is comparable to oil extension of SBR; naphthenic and paraffinic oils, however, are preferred.

The properties of ethylene—propylene elastomers indicate that they should be useful in a wide range of products such as tires, mechanical goods, belting and wire coating. Good resistance to ozone and discoloration should make them attractive in non-black products. With the peroxide cure, they appear to be excluded from uses where low temperature cures and air cures are required.

3:15 P.M.—4—Vulcanization and Properties of Trifluoronitrosomethanetetrafluoroethylene Elastomer. ***C. H. Crawford (Minnesota Mining & Mfg. Co., St. Paul, Minn.), C. B. Griffis, J. C. Montermoso and Angus Wilson (Quartermaster Research & Engineering Center, U. S. Army, Natick, Mass.). (Paper will be presented by Mr. Montermoso.)***

There is an urgent need for new elastomers which will meet the current and future requirements of military operations. Rubbers are being sought which possess a combination of two or more of the following characteristics: (1) chemical resistance, (2) low temperature flexibility, (3) thermal stability at high temperatures, (4) flame-retardance and (5) radiation resistance. The work reported here on fluorinated nitroso rubber is directed toward this objective.

A copolymer of trifluoronitrosomethane-tetrafluoroethylene is an elastomer having a molecular weight of over a million as determined by light-scattering techniques. The rubber contains no hydrogen. It has an entirely new type of structure with a -N-O-C-C- in the backbone of the molecular chain.

Vulcanization methods, including data on physical properties will be presented. Results thus far obtained showed the rubber to be non-flammable, also possessing a good combination of chemical resistance and low-temperature flexibility.

3:30 P.M.—5—Preparation of Crystalline Polyaldehydes. ***Hiroyasu Fujii, Junji Furukawa and Takeo Saegusa (Kyoto University, Kyoto, Japan). (Paper will be presented by Mr. Furukawa.)***

Previously we reported that, by γ-alumina, acetaldehyde was polymerized to elastomeric polymer. The configuration of the carbon atom of the main chain of this polymer was thought to be irregular. Therefore, it has been assumed that there can exist stereoregular (crystalline) polyacetaldehyde besides this irregular (amorphous) one.

By using organometallic compound as the catalyst, we succeeded in the preparation of crystalline polyacetaldehyde. The polymerization was carrier out at a lower temperature, e.g., at the temperature of a dry-ice acetone bath. The polymer thus obtained was found to be crystalline by x-ray diffraction. From its infra-red spectrum, the crystalline polymer has the same structure (methylpolyoxymethylene) as that of the amorphous one, but its absorption is much sharper and more intense. In solubility the crystalline polymer differs markedly from the amorphous one. The latter is easily soluble in common organic solvents, while the crystalline one resists solvent, part of which is soluble only in chloroform.

By organometallic compounds, other aldehydes such as propionaldehyde and trichloroacetaldehyde were also polymerized to crystalline polymers. It may be suggested that an active species in polymerization is the corresponding metal alkoxide. In fact, we found that some metal alkoxides were active catalyst for the polymerization of aldehydes.

3:55 P.M.—6—Effect of Isocyanate Structure on Cured Polyurethane Properties. ***C. F. Blaich, Jr., and A. J. Sampson (Carwin Co., North Haven, Conn.). (Paper will be presented by Mr. Blaich.)***

Urethane elastomers are finding increased usage in industry because of their excellent physical properties. Most urethane elastomers used by industry today are based on toluene diisocyanate (TDI) or methylene bis [4 phenylisocyanate] (MDI). Necessary variations in physical properties of the urethane have been obtained either by varying other reactants in prepolymer formation or by variation in curative systems.

In a recent program to determine the effect of isocyanate structure on urethane properties; 3,3′-dimethyl biphenyl diisocyanate; 3,3′-dimethoxy biphenyl diisocyanate; biphenyl diisocyanate; 3,3′-dimethoxy; 4,4′-diphenylmethane diisocyanate; 3,3′-dimethyl; 4,4′diphenylmethane diisocyanate, **p**-phenylene diisocyanate, **m**-phenylene diisocyanate, **m**-xylylene diisocyanate, decamethylene diisocyanate, toluene diisocyanate and polymethylene polyphenylisocyanate were evaluated as ingredients in urethane prepolymers. These isocyanates were reacted with known, commercially available polyesters and polyethers.

These urethane prepolymers were cured with conventional amine curing agents and were evaluated by standard ASTM tests. The effect of isocyanate structure on hardness, tensile strength, ultimate elongation, stress-strain characteristics, tear strength, compression set, solvent resistance and temperature resistance was determined. Test results indicate that isocyanates of the biphenyl structure, such as 3,3′-dimethyl, 4,4′-biphenyl diisocyanate imparted drastically improved stress-strain characteristics, ultimate tensile strength, solvent resistance and temperature resistance. The type substitution in the position ortho to the isocyanate group of the biphenyl directly effected the polymer properties, particularly the stress-strain relationships.

Urethane prepolymers based on toluene diisocyanate or 4,4′-diphenylmethane diisocyanate may be modified with the

biphenyl type diisocyanates to yield decidedly improved properties. Polymethylene polymenylisocyanate could not be used to form a stable prepolymer. However, when used in a "one shot" system, urethane polymers with 400° F. volume stability were formed, although these polymers had poor tear strength. All prepolymers were formulated to yield viscosity and stability characteristics amenable to commercial use in conventional mixing equipment. Also, all prepolymers were made by normal prepolymerization techniques in conventional equipment.

4:15 P.M.—7—A Study of First and Second Order Transition in Neoprene. ***J. D. Detenber and R. M. Murray (Elastomers Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Del.). (Paper will be presented by Mr. Murray.)***

The first and second order transition of neoprene was studied to understand better the low temperature behavior of neoprene vulcanizates.

First order transition of several types of neoprene was measured by change in volume (dilatometrically), durometer hardness, Young's modulus and cold compression set. The effect of temperature on rate of crystallization for Type GN and W vulcanizates was determined. The optimum crystallization temperature was found to be —12° C. It was shown that the temperature at which a vulcanizate is crystallized determines the minimum temperature at which it will thaw, the thaw point being approximately 15° C. higher than the crystallization temperature. Increased state of cure was shown to decrease crystallization rate. Compounding variables studied included the effect of sulfur, and type and amount of loading and plasticizer. Low temperature plasticizers increases crystallization rate to varying degrees. Delayed stiffening at —40° C. results from crystallization favored by the presence of low temperature plasticizers, rather than phasing-out of the plasticizer due to incompatibility at low temperatures, as previously believed. The brittle point was not changed as a result of crystallization.

Second-order transition was studied using Clash-Berg torsional stiffness, durometer hardness and cold compression set tests. Brittle point was shown not to be directly related to second order transition. Brittle point and second order transition temperature were determined for vulcanizates of the general purpose neoprenes. Compounding variables included type and amount of plasticizer and filler.

4:35 P.M.—8—Magnesium Oxides in Chlorobutyl. ***W. H. Deis and L. F. Heneghan (Marine Magnesium Div., Merck & Co., South San Francisco, Calif.). (Paper will be presented by Mr. Deis.)***

Magnesium oxide functions in many chlorobutyl compounds as a scorch retarder and as a stabilizer to improve retention of properties during high temperature exposure. This study was made to explore the optimum amount and type of magnesium oxide best suited for various chlorobutyl compounds and to establish magnesium oxide properties critical to performance.

This paper summarizes the results obtained with various levels and types of magnesium oxide, curatives, fillers and retarders, correlating these results for both black and non-black compounds with the properties of the magnesium oxide. Retardation of scorch and cure-rate in black compounds is related to the characteristics and amount of magnesium oxide, as well as to the curative system. Quite surprisingly, magnesium oxide functions both as a scorch retarder and as a vulcanizing agent in certain non-black compounds and gives results very similar to those obtained with organic promoters. In these compounds, heat interaction is not necessary to obtain the promoter effect, and the compounds do not discolor. Magnesium oxide can replace zinc oxide in certain compounds to give a better over-all balance of properties. Magnesium oxide reduces surface cracking and surface tack, which often occur in non-black compounds during outdoor exposure.

There is a definite correlation between surface activity (iodine adsorption) of magnesium oxide and its performance in chlorobutyl. However, results can also be affected by the curative and retarder systems employed in black and non-black compounds, and by fillers in non-black compounds. Results of our study of these variables in basic formulations will be presented. These results represent a definite contribution to the compounding knowledge of chlorobutyl.

Thursday Morning—Sept. 15

Symposium on "Reinforcement" (No. 9-13)

J. Rehner, Presiding

9:00 A.M.—9—Modern Role of the Electron Microscope in Rubber Research. ***M. W. Ladd and W. A. Ladd (Ladd Research Industries, Inc., Roslyn Heights, N. Y.). (Paper will be presented by W. A. Ladd.)***

Until recently, the main role of the electron microscope in rubber research was the determination of particle size and shape of reinforcing pigments and fillers, carbon reticulate structure, latex particle size and ultimate dispersion. Improvements in resolution, development of new techniques and accessory equipment have greatly changed this role. Today, carbon particle structure, as contrasted with reticulate chain structure, can be studied. The effect of oxidation, excessive heat treatment, even porosity can also now be studied. Clues to the actual process of carbon particle formation can be obtained.

Freezing and fracturing techniques permit the study of typical dispersions, where only ultimately good dispersions, often misleading, were seen previously. Stereo-micrography is an invaluable tool in the study of these surfaces. Cooling units for use in evaporators permit the replication and examination of low-melting-point materials; e.g., accelerators. Dynamic studies, such as the stretching of thin reinforced rubber films, are now possible. Holders that can be heated from 600° to 1000° C. eliminate one of the major difficulties in the study of carbon blacks, namely contamination or build-up in the microscope itself. Contamination has been a serious handicap, particularly with SAF and other fine blacks. Low-temperature holders for low-melting point materials are also available. The electron microscope today is no longer a static, but a dynamic tool with great new horizons in the study of reinforcement. Today, controlled experiments to interpret fully what high resolution constantly reveals is one of the prime requisites.

9:25 A.M.—10—The Effects of Carbon Black Structure on Tire Tread Wear. ***Thomas D. Bolt and Eli M. Dannenberg (Godfrey L. Cabot, Inc., Cambridge, Mass.). (Paper will be presented by Mr. Bolt.)***

Carbon black structure has been shown to affect such rubber properties as viscosity, processing smooth-out, modulus and hardness. Recently the carbon black industry introduced new low-structure oil furnace blacks in the particle size range of HAF, ISAF and SAF blacks. These new carbon blacks are of interest in tire treads for obtaining low hardness and quiet soft-riding performance.

Because the development of soft treads has at times been associated with a loss in tread-wear resistance, the road test performance of treads incorporating carbon blacks at several levels of carbon-black structure and of carbon black loading has been investigated. Since relative tread-wear resistance is expected to vary with the severity of the road tests, tread performance is assessed at different rates of wear. It is shown that low-structure oil furnace blacks can provide low hardness treads with the wear resistance of an ISAF black tread over a range of road test severities. The use of lower carbon black loadings and lower carbon black structure in tire treads, at very high rates of wear, results in some decrease of road-wear performance.

9:50 A.M.—11—The Chemistry of Carbon Black in Rubber Reinforcement. ***K. A. Burgess, F. Lyon and C. W. Sweitzer (Columbian Carbon Co., Princeton, N. J.). (Paper will be presented by Mr. Sweitzer.)***

The chemistry of carbon black in rubber reinforcement has received increasing attention in recent years. This inter-

est has followed from a better understanding of the chemical nature of the carbon black surface and the recognition that chemical interactions involving carbon black play a significant role in reinforcement.

Investigations have involved the identification of specific oxygen functional groups on the surface of the particles, as well as the nature of the carbon black surface itself. Studies have shown that these functional groups and the nature of the carbon surface, responsible for the interaction between carbon black and rubber during mixing and vulcanizing, have profound effects on final vulcanizate properties. The interdependence of surface chemistry and structure in developing certain rubber properties has been established. This has led to the more exacting control of surface chemistry, as well as particle size and structure, for the development of the most effective carbon blacks for all rubber applications.

10:15 A.M.—12—Peroxide and Radiation Cured Compounds Filled with Reinforcing Fine Particle Silica. *J. H. Bachmann, B. J. DeWitt, J. W. Sellers, C. C. Stueber and M. P. Wagner (Columbia-Southern Chemical Corp., Barberton, Ohio). (Paper will be presented by Mr. Sellers.)*

There are indications that the chemical reaction involved in bound rubber formation proceeds by a free radical mechanism for compounds filled with reinforcing hydrated fine particle silica, as in the case of carbon black. The high potential of silica to reinforce is indicated by its bound rubber formation. Evidence of filler-polymer interaction was obtained in filled vulcanizates cured by peroxide and by high-energy radiation, respectively. Both of these relatively simple curing systems are postulated to effect cross-link formation via a free radical mechanism.

A logical measure of the ability to reinforce is the value, after cure, of the ratio of the cross-link density of the filled compound, to the cross-link density of the respective unfilled compound, $^{\nu}/_{\nu_0}$. In silica-filled natural rubber compounds (30 vol.) values of $^{\nu}/_{\nu_0}$ were obtained: peroxide cure, 1.5 to 1.8; radiation cure, 3.8. Comparisons are made with similarly cured HAF black filled stocks. Sulfur-cured natural rubber stocks, filled (30 vol.) with HAF black, generally exhibit $^{\nu}/_{\nu_0}$ values in the range 1.5 to 2.0. Comparative effects of antioxidants are described.

10:40 A.M.—13—Attrited Carbon Blacks and Their Behavior in Elastomers—Part 3. *A. M. Gessler (Esso Research and Engineering Co., Linden, N. J.).*

Severe attrition of carbon blacks produces important changes in the physical and chemical properties of the blacks. The resulting alterations in surface area, aggregate structure, surface oxygen content and pH lead to significant modifications in the reinforcing capacities of the blacks.

Earlier work has shown that, in butyl, attrited blacks yield greatly improved stress-strain properties and dynamic behavior. In addition, cure rate is enhanced to the extent that it is very nearly comparable to that of styrene rubber, although similar improvements are not directly translated to styrene rubber. Severe cure retardation and inferior properties are experienced. This difficulty, however, is circumvented through special techniques, which are described. Attrited black-styrene rubber systems display excellent cure rates, tensile strength, extensibility and hysteresis properties. In addition, they possess the advantage of reduced modulus and hardness. These and other properties of styrene rubber systems are discussed in terms of changes occurring through attrition in the aggregate structure of the black, and the nature of the polymer-black surface interaction.

11:05 A.M.—14—Ultrafine Talc/SAF Black Mixtures in SBR-1500 Vulcanizates. *R. S Lamar, H. T. Mulryan and M. F. Warner (Sierra Talc Co., South Pasadena, Calif.). (Paper will be presented by Mr. Warner.)*

Additions of ultrafine talc to SAF black in SBR-1500 compounds eliminate "nerve," markedly reduce Mooney viscosity and heat build-up on the mill. Extrudability and general processability are improved. Ultrafine talc, because of its unique physical structure, acts as an internal lubricant permitting particles of carbon black to slide past one another in the compound.

SBR-1500 vulcanizates, containing mixtures of ultrafine talc/SAF black, show increased tensile strength and greater elongation than is obtained with SAF black alone. Under certain conditions modulus values and tear resistance are also improved. It is believed that the ultrafine talc assists in the dispersion of the black particles, disrupts the carbon-to-carbon chainlike structures and increases the extent of the carbon/polymer interface.

Similar results have been obtained with ISAF and HAF blacks in various mixtures with ultrafine talc.

11:25 A.M.—15—The Pico Abrasion Test for Rubber Stocks. *H. W. Grinter, E. B. Newton and D. S. Sears (Research Center, B. F. Goodrich Co., Brecksville, Ohio). (Paper will be presented by Mr. Newton.)*

This laboratory abrasion test is unique, as far as the authors know, in that it will evaluate different polymers in addition to the usual differentiation of reinforcing agents for the same polymer. The machine consists basically of two parallel tungsten carbide blades set to the right and left of the center of rotation of the cylindrical test piece, and held in contact by a weight. Silica dust is sifted on to the sample during the test. Comparisons of abrasion resistance of stocks under test are made on a volume-loss basis (determined gravimetrically) against the five stocks used to calibrate the machine. These five calibration standards are as follows: natural rubber - EPC black (arbitrarily based index of 100); hot SBR-EPC black (index 90); cold SBR-EPC black (index 110); cold SBR-HAF black (index 125); and cold SBR-SAF black (index 150). It will be seen that these standards are combinations of three different polymers and three different blacks. The indexes assigned to these stocks are based on results of tire tests run at 60 mph on passenger cars on Texas roads. That is to say, the indexes are based on one, perhaps somewhat approximate, degree of severity. If the severity of the road test is changed, the relative indexes have to be changed.

In general, the test has provided a good differentiation of unknown tread stocks at the laboratory level. Allowing a spread of ± 10 per cent from a true correlation, Pico indexes run on tread ribs cut from test tires have agreed quite well with road results. The severity of the Pico test can be altered by changing the weight on the knives, so that this procedure can be used to differentiate stocks further. For example, at low severity (i.e., using a light weight), cast polyurethane stocks show much higher abrasion resistance than the natural rubber-EPC black control does; but, at high severity, polyurethane stocks are relatively poorer than the natural rubber stock, although the actual volume loss of each stock increases. A reverse order is obtained with styrene rubber tread stocks, because they show higher abrasion resistance at high severity than do natural rubber treads. These two trends agree with service tests.

Thursday Afternoon—Sept. 15

"Rubber Chemistry"

W. S. Coe, Presiding

2:00 P.M.—16—Recent Developments in High Temperature Rubbers. *C. S. Marvel (University of Illinois, Urbana, Ill.).*

In the past, rubbers have not been very useful for applications involving high temperature. This was particularly true of natural rubber. Some of the synthetic elastomers turned out to fit some of these applications better than natural, but these were still not good enough. Also, new applications developed, such as jet planes, rockets and space-age material in general, requiring heat-resistant elastomers, better than anything available in the past and designed specifically for the job. This has led to a great amount of research in elastomeric polymers to make them withstand very high temperatures. This talk summarizes the newer developments in the field.

2:40 P.M.—17—Reaction of Sulfur, Hydrogen Sulfide, and Accelerators with Propylene and Butadiene. ***Frederic J. Linnig, Edwin J. Parks and Leo A. Wall (U. S. Dept. of Commerce, National Bureau of Standards, Washington, D. C.). (Paper will be presented by Mr. Linnig.)***

This work was undertaken as part of a study of the processes involved in vulcanization. Previous infrared studies showed that sulfur vulcanizates have conjugated double bonds which are reduced in amount when accelerators, such as methyl zimate, are used.

In the present work, propylene is used as a model compound for the original olefin in rubber, and butadiene as a model compound for the conjugated system acting as an intermediate. These compounds are reacted with sulfur alone, with hydrogen sulfide alone, and with each of these materials in the presence of a vulcanization accelerator, as well as free radical accelerators to explore the mechanisms of the reactions.

The results of mass spectrometer analyses indicate the formation of sulfides, disulfides, and carbon-to-carbon bonds. Methyl zimate used as a vulcanization accelerator produces hydrogen sulfide from the olefin or diolefin and, in turn, accelerates the reaction of hydrogen sulfide with the olefin or diolefin. The accelerated reaction between the diolefin and hydrogen sulfide is complete, accounting at least partially for the decreased conjugation in accelerated vulcanizates. Certain aspects of the reaction do not appear to be free radical in nature, including the formation of diisopropyl sulfide from propylene and sulfur, and from propylene and hydrogen sulfide. The reaction also involves the formation of sulfide and other linkages from what appear to be free-radical fragments of the original molecule. This last conclusion is more applicable to reactions with the intermediate conjugated system, than to these with the original double bond. Electron-spin resonance studies with sulfur compounds confirm the presence of free radicals.

3:05 P.M.—18—Evaluation of Progressive Changes in Elastomer Properties During Vulcanization. ***W. E. Claxton, F. S. Conant and J. W. Liska (Firestone Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Conant.)***

An apparatus and method are described for evaluating state of cure, optimum cure time, rate of cure, induction time for cure, scorch time, induction time for reversion, reversion rate and degree of reversion of elastomeric compounds. Coincident with these determinations vulcanizate specimens are prepared on which more conventional physical test data may be obtained; e.g., compression modulus, compression set, hardness, specific gravity, tensile modulus and elongation.

In essence, the method described provides a progressive measure of modulus change during cure or reversion through the change in deformation of a periodically loaded plunger, one end of which is embedded into the specimen. Typical results are given showing application of the apparatus to screening tests, millroom control, reversion studies, and to compounds which are too stiff for conventional test methods. Demonstrated advantages for the apparatus include time saving, stock saving, and better cure information on a wider range of polymeric compounds than is obtainable from tensile test methods. In a laboratory, where a large selection of test instruments is not feasible, the versatility of the apparatus described should prove very advantageous.

3:20 P.M.—19—The Vulcanization and Properties of Blends of Chlorobutyl with Other Rubbers. ***F. P. Ford, J. T. Kehn and G. J. Ziarnik (Esso Research and Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Ziarnik.)***

The results of studies on vulcanization systems for blends of chlorobutyl (MD-551) and other elastomers are reported. The development and approaching commercial production of this new material makes possible and practical the use of polymer blending techniques to improve product quality, compound processing or cost, if one of the polymers has the characteristic properties of butyl rubber.

Properties are a function of the curative system employed, which, in turn, is related to the relative proportions and to the nature of the other elastomer in the blend. Medium speed (DOTG) or delayed action accelerators (2-MT) and sulfur donors have in general been found to be effective components of curative systems for blends of MD-551 with the highly unsaturated elastomers. In discussing effects of vulcanization systems, major emphasis is given to chlorobutyl-natural rubber blends, but the vulcanization and properties of blends with neoprene, styrene rubber, nitrile rubber, polybutadiene and whole tire reclaim are also described. By use of covulcanization techniques, it is now possible to obtain butyl-type properties in wider areas of applications; for example, applications where some degree of oil resistance or enhanced low temperature properties are required.

3:45 P.M.—20—Cross-Linking Efficiency of Dicumyl Peroxide. ***Lester G. Nabors and Merton L. Studebaker (Rubber Chemicals Div., Phillips Chemical Co., Akron, Ohio). (Paper will be presented by Mr. Studebaker.)***

At the Buffalo, N. Y., Meeting of the Division of Rubber Chemistry, A.C.S., May 4-6, 1960, C. R. Parks and O. Lorenz reported on the use of model systems to study the cross-linking efficiency of dicumyl peroxide. In this paper, a similar study on gum and carbon black loaded SBR-1500 and natural rubber is presented.

4:05 P.M.—21—Use of Selenium and Selenium Compounds in Rubber Compounding. ***W. J. Mueller and S. Palinchak (Battelle Memorial Institute, Columbus 1, Ohio). (Paper will be presented by Mr. Mueller.)***

This study was undertaken to investigate possible new uses for selenium and selenium compounds in rubber compounding. During the work, selenium compounds were considered as (1) cross-linking agents, (2) accelerator-antioxidant combinations, and (3) antirads.

It was found that powdered selenium was an effective cross-linking agent in styrene rubber, butyl, Hypalon, and acrylate polymers. Replacement of sulfur with selenium as the cross-linking agent improved the retention of physical properties on aging. The choice of accelerator used with selenium was important in order to avoid under-cures. With butyl rubber, the aging properties obtained with selenium cures were better than with sulfur cures, but poorer than with phenolic cures. Dibenzylselenourae and bis (2-hydroxy-1-naththyl) selenide were found to be effective as combination accelerator-antioxidants. Each of the selenium compounds was almost as effective as a combination of PBNA and benzothiazyl disulfide. Several selenium compounds had antirad properties, but were no more effective than PBNA.

These results indicate that selenium or selenium compounds can be used to increase the heat resistance of several polymers. This behavior should permit the use of these polymers at higher operating temperatures than obtained when employing sulfur cures.

4:25 P.M.—22—Viscosity Changes in Rubber Solutions Under Various Exposure Conditions. ***A. R. Kemp (Rubber Technology Foundation, University of Southern California, Los Angeles, Calif.)***

Little has been published regarding the changes taking place in rubber under normal laboratory handling in the course of fractionation, drying, solution and standing in the dark, or on the laboratory bench in light at room temperatures. This information is important in connection with research studies dealing with viscosity, osmotic pressure and other measurements used to characterize the hydrocarbon. Phenyl-beta-naphthylamine and tetramethylthiuram-disulfide have been added by some investigators to rubber solutions as stabilizers. However, no information on their effectiveness has been presented.

This paper presents data on the effect of various antioxidants and other chemicals on the viscosity stability of rubber solutions, where viscosity measurements are used as a very sensitive means of determining changes in rubber under various conditions of exposure. Natural rubber hydrocarbon, when prepared under suitable conditions, is very stable in solution at room temperature in the dark, with air over the solution. Short periods of light-exposure on the laboratory bench bring about rapid oxidation scission of the rubber hydrocarbon in solution, with resulting large decreases in viscosity. A few chemicals, such as some of the hydroxybenzene derivatives, give some protection in the dark and light. No chemical has, however, been found to be very effective in the light. Most of the antioxidants and other chemicals are shown to act as catalysts under both dark and light exposure. The natural rubber antioxidant is very effective in the dark, but offers only a small amount of protection in the light.

Friday Morning—Sept. 16

General Papers

E. H. Krismann, Presiding

9:30 A.M.—23—Determination of Dynamic Properties of Elastomers by High Speed Stress Relaxation. ***R. M. Cardillo and W. W. Gleason (Enjay Laboratories, Linden, N. J.). (Paper will be presented by Mr. Cardillo.)***

Dynamic properties of elastomers can be measured over a broad range of frequencies, temperatures and strain levels, using short time relaxation data on samples stressed at very high speeds. The data, expressed as dynamic modulus and loss modulus, represent results which would be extremely difficult to obtain in direct vibratory tests at the strain levels covered in these experiments (up to 450 per cent). They provide information sorely needed by design engineers working with shock absorption, vibration damping and acoustical insulation problems. Complex mechanical equipment and measuring devices are not needed, since results are mathematically derived from a single high-rate stress relaxation curve. Tests can be run in tension or compression, and degradation of samples by heat build-up is not a problem.

The high rate stress relaxation technique has been used to determine the frequency response of butyl and natural rubbers, characterizing the dynamic behavior of these materials up to 10^6 cps. These results supply detailed information on high-frequency response at high strain levels. Tests were run from —40° to 75° C. The data show that butyl rubber possesses high hysteresis in the intermediate frequency ranges, while natural rubber does not develop large amounts of damping until very high frequencies are reached. This technique can be further employed to study effects of compounding variables and molecular structures, as well as to characterize the behavior of other elastomers.

9:50 A.M.—24—Selection of Mixing Equipment for Silicone Rubber Manufacture. ***D. E. Miller and A. O. Liermann (Silicone Products Dept., General Electric Co., Waterford, N. Y.). (Paper will be presented by Mr. Liermann.)***

Criteria for the comparison of mill mixing and doughmixer mixing of silicone rubber are presented. The advantages and disadvantages of both types of equipment are discussed, including: safety aspects; product uniformity and output; flexibility; materials handling; space requirements, and costs. In addition, some of the peculiar design requirements for mills and doughmixers used for silicone rubber are described.

10:10 A.M.—25—The Effective Utilization of Blowing Agents. I—A Series of 1,1′-Azobisformamides. ***Henry A. Hill and Henry R. Lasman (National Polychemicals, Inc., Wilmington, Mass.). (Paper will be presented by Mr. Hill.)***

Studies were made to broaden the range of usefulness of 1,1′-azobisformamide (ABFA), which had been considered unsuited for use as a blowing agent in rubber because of its high decomposition temperature (195° C.). In addition to compounding studies in several elastomers and plastics, the method of preparation of ABFA was investigated. Comparison showed that the activity of the product as a blowing agent for styrene rubber varies with process conditions. An approximately quantitative measure of this activity is expressed in the designations Kempore 60, 100, 125 and 150 for the series of ABFA's.

In tabular and graphic forms, this paper presents data which show the performance of these blowing agents in systems based upon styrene rubber, butyl rubber, neoprene, PVC and polyethylene. Factors influencing the expansion of the several systems are illustrated, particularly the non-linear relationship between the amount of blowing agent used and the reduction in density obtained. The densities of four chemically identical compositions based on styrene rubber were found to vary from 0.3-0.9. ABFA-polymer interaction is postulated for some vulcanized elastomers, and is discussed in view of the known cross-linking action for other azo compounds. Methods and insights are provided for control of cell structure, hardness and density, which effect economies in use of this blowing agent, just as further work presently under way extends the scope of usefulness of several new blowing agents.

10:35 A.M.—26—Heat-Aging Behavior of Clay-Loaded Butyl Insulation. ***F. Rodriquez and C. C. Winding (Geer Rubber and Plastics Laboratory, Cornell University, Ithaca, N. Y.). (Paper will be presented by Mr. Rodriquez.)***

Butyl rubber compounds loaded with calcined clay and vulcanized by a non-sulfur quinoid system have been favored for electrical insulation under hot, moist conditions. Now it has been discovered that the addition of certain polyolefins to these compounds can extend their usefulness into a broader range of conditions without impairing electrical stability.

In the particular formulation investigated, stearic acid was found to be quite detrimental to heat stability. Elimination of stearic acid and addition of 10 or more parts of linear polyethylene or certain other polyolefins gives compounds which increase in tensile strength on aging up to three weeks at 121° C., rather than losing strength. The added retention of tensile strength is also noted on aging in water at 90° C. up to three weeks. In addition, dielectric constant, power factor, and volume resistivity have been found to be very stable over a period of a year during which the samples were immersed in water at 90° C. Butyl, loaded with talc or a thermal black, also responds as with clay to modification by polyolefins. On the other hand, butyl reinforced with channel black or silica is not improved by polyolefin addition. An improvement in tensile strength retention by clay-loaded butyl insulation, without sacrifice of electrical stability, should give a useful engineering material new opportunities for service.

10:55 A.M.—27—New Compounds for Air Barriers in Tubeless Tires. ***J. V. Fusco (Enjay Chemical Co., Elizabeth, N. J.), and R. H. Dudley (Enjay Laboratories, Esso Research & Engineering Co., Linden, N. J.). (Paper will be presented by Mr. Fusco.)***

The air holding and age-resisting properties of butyl rubber resulted in the wide acceptance of butyl inner tubes in the postwar years. With the advent of the tubeless tire, it became desirable to find a butyl-type polymer having improved compatibility with other rubbers for use in the tire inner liner. Such an air barrier would be expected to minimize tread separation or blowouts resulting from air penetration into the carcass.

This paper presents data on the application of chlorobutyl (MD-551), a new, chlorine-modified butyl rubber in tire inner liners. Chlorobutyl has a molecular structure similar to butyl. Thus, it has equally excellent air-holding and age-resisting properties. The allylic nature of the chlorine in the butyl molecule enhances the polymer's compatibility with unsaturated rubbers commonly used in tire carcasses. It also permits a wide variety of operable cure systems with improved adhesion to other rubbers. Permalux, thiocarbanalide, 2 mercapto thiazoline, NA-22, and various organic acids or acid anhydrides, are all effective accelerators for chlorobutyl. An outstanding accelerator combination is a new low-cost system which consists of zinc oxide activated by a rosin acid.

Compounds with adhesion to a natural rubber carcass stock of 70-140 lbs./in. are possible. In factory-built tires, such a compound gives adhesion to the carcass equivalent to an inner liner prepared from current, more permeable, unsaturated polymers.

11:15 A.M.—28—Determination of Latex Particle Size Distributions by Fractional Creaming with Sodium Alginate. *E. Schmidt and P. H. Biddison (Chemical and Physical Research Laboratories, Firestone Tire & Rubber Co., Akron, Ohio). (Paper will be presented by Mr. Schmidt.)*

A method was developed for the determination of the mass-particle size distribution in latices, by fractional creaming with sodium alginate. This method was based on the observation that the size of creamed latex particles depends quantitatively on the prevailing concentration of sodium alginate, regardless of the nature of the latex. A calibration curve, indicating inverse proportionality between creaming agent concentration and size of particles creamed, was prepared with the aid of the electron microscope.

By the use of this calibration curve, particle size distributions of latices covering a range from 500-10,000 A.U. diameter can be determined with no equipment other than an analytical balance and a number of separatory funnels. This method is particularly advantageous for analyzing latices of very wide particle-size distributions, which, when examined electron-microscopically, would require the counting of a very large number of particles. Detailed procedures and applications of this method are described.

11:30 A.M.—29—The Automation of Goodrich Flexometer Testing. *A. F. Cody (Enjay Laboratories, Linden, N. J.).*

The Goodrich Flexometer has gained wide acceptance in the rubber industry as a tool for testing the compression fatigue characteristics of both natural and synthetic rubber vulcanizates. Comparative data obtained with this instrument are particularly useful in research and development work to assist in estimating the service quality of vulcanizates in various applications, such as tires.

As presently constituted, the test requires the full attention of a skilled operator for extended periods of time. The present work was undertaken to devise a means of releasing this operator for other duties during the conduct of a test. Satisfactory automation of this equipment has been accomplished by means of a special rebalancing mechanism, together with suitable recording equipment to indicate temperature and compression changes throughout a test. These modifications have not influenced the basic characteristics and capabilities of the machine in any way. They do provide an increased utility for the equipment at moderate cost which would be expected to be of interest to a considerable segment of the rubber industry.

Coming Soon . . .

Improved Butyl Rubber Vulcanizates—By C. J. Jankowski, K. W. Powers and R. L. Zapp, Enjay Laboratories, Linden, N. J.

How superior butyl rubber vulcanizates are obtained by replacing normal sulfur loading and accelerator with sulfur donor and low sulfur—high accelerator vulcanization systems.

Engineering Factors in Coating with Silicone Rubber for High Temperatures—By H. I. Silversher, R. C. Shaffer and R. A. Landry, Western Backing Corp., Culver City, Calif.

When glass cloth is combined with a silicone compound, the resulting product derives mechanical strength from the glass in addition to flexibility and protection from the rubber.

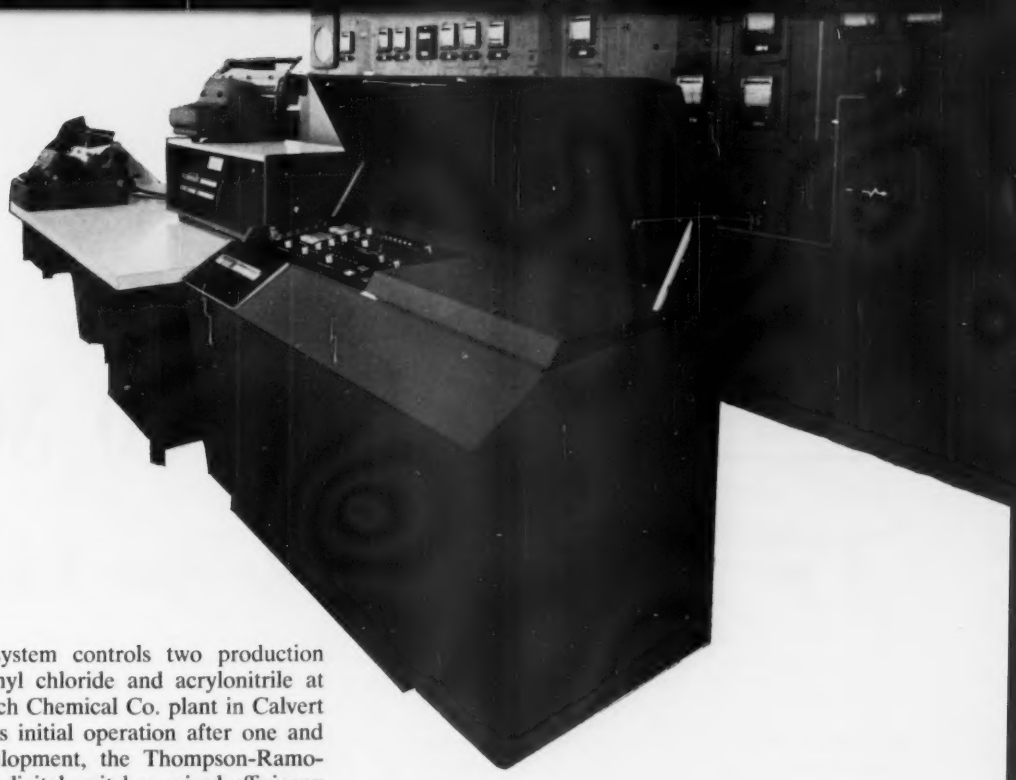
The Role of Carbon Black in the Thermal Oxidation of Polyolefins—By W. Lincoln Hawkins, Bell Telephone Laboratories, Murray Hill, N. J.

The ability, exhibited by many carbon blacks, to inhibit the free radical oxidation of polyolefins is dependent on the presence of certain reactive groups on the surface of the carbon particles. Heating in the presence of oxygen or sulfur increases the number of reactive groups to produce a much more effective antioxidant.

PLUS R/A SPECIAL INDUSTRY REPORT

Music for the Rubber Production Line

Pleasant listening may mean greater efficiency and higher output, according to recent psychological studies. The objective is to soothe the harried worker without putting him to sleep.



COMPUTER
masterminds production at
VINYL CHLORIDE PLANT

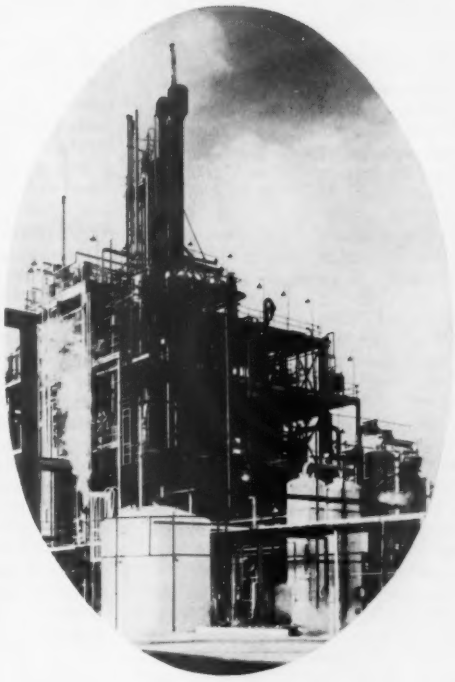
A COMPUTER system controls two production processes for vinyl chloride and acrylonitrile at the B. F. Goodrich Chemical Co. plant in Calvert City, Ky. Now in its initial operation after one and a half years of development, the Thompson-Ramo-Wooldridge RW-300 digital unit has raised efficiency in terms of inventory control, drawing on its pre-planned intelligence to achieve better utilization of raw materials and equipment.

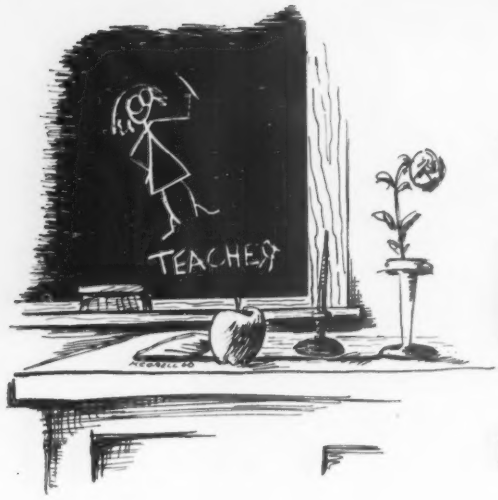
Its late design allows it to handle over-all economic data, such as market conditions and inventory size. This has increased production, reduced operating costs and improved quality control. For the acrylonitrile process all three factors play a part, while for vinyl chloride the last two are paramount.

Once the company decided such a computer system was feasible, a practical mathematical model of each process was drawn up to predict limitations under varying sets of operating conditions and to indicate necessary control actions. The model was based on an "objective equation" to calculate anticipated profits, and operating costs. "Restraints" constituted another component, defining the capabilities of the control system itself. The third important set of equations spelled out mathematical relationships between operating characteristics and the factors that could be controlled. These three equations, with all auxiliary functions such as testing of instrument signals, were then programmed to become part of the computer's memory for Geon resin and Hycar rubber making.

The heart of the programming system is called the "executive routine." It operates a timing diagram of all computer duties, delegating certain tasks to specific components at appropriate times.

The computer even "examines its own health" to determine whether it should continue to run. However, it is the optimization program, run every eight hours, that comes closest to performing a true management function. In effect, it takes an over-all look at plant economics to calculate the optimum set of profit-loss conditions for any operating period.





This Fall, It's . . .

BACK TO SCHOOL

for Rubber Executives

► "THE COURSE is excellent. I enjoyed every meeting. As a result of applying some ideas I gathered from the various lectures, my company is making progress in personnel practices, in advertising, in financial control, and in many other noticeable ways."

This was the comment of the president of a small company making a rubber specialty item, from a letter he sent to the U. S. Small Business Administration. The manufacturer was writing about the administrative management course he had attended at one of the nation's leading educational institutions, under joint sponsorship of the school and S.B.A.

Hundreds of Offerings Each Year

Unbeknownst to many rubber company owners and managers—as well as to those in other businesses—the Small Business Administration now cosponsors literally hundreds of such courses, in all parts of the United States, during the fall and spring each year. Businessmen who attend the courses naturally come from varying educational backgrounds. Some have college degrees, others do not. In only two respects are they all alike: they must be owners or managers of businesses, and they must have a common desire to improve their over-all management ability.

So, whoever you are and wherever you are: Why don't **you** go back to school? Experience has probably taught you that nobody knows everything about any subject, and that most executives could do with a lot more formal knowledge in many areas, particularly management techniques.

If you **are** interested in attending one of these special courses, be on the lookout for announcements regarding enrollment. To be on the safe side and to make certain you do not miss the next seminar in your region, write to the U. S. Small Business Administration, Washington 25, D. C., inquiring about possible courses available within a convenient travel radius of your home or office. The cost is moderate—$35 to $50 per course—and classes are conducted for two or two and one-half hours on the same night each week, for the eight or ten-week term.

Perhaps the greatest advantage from this modest outlay of money and time is that you will be able to come into contact with bona fide specialists in various management fields. From an actual dollars-and-cents standpoint, you will have the opportunity to "pick the brains" of consultants whom you could not retain, individually, for many times the amount you pay for the course. Since knowledge is power, especially in business, it would be smart for you to go back to school through this program whenever the opportunity arises.

Some Travel Miles to School

One example that may seem incredible to some rubber company managers doubting the need for more education to sharpen their management skills: A West Virginia man and his wife, who jointly operate a small business, traveled nearly 300 miles every Tuesday evening for 10 weeks to attend evening classes cosponsored by S.B.A. at the Virginia Union University at Richmond. Another Richmond student was a business manager who flew each week from Norfolk, Va., to attend his course. On the West Coast, two businessmen traveled 85 miles each way for 10 weeks to make a perfect attendance record at their classes.

These courses in administrative management are limited in number and usually held on an informal basis. Sometimes, instead of meeting in a classroom equipped with desks, students get together in a lounge; often, at the end of the first hour, coffee is served. At other times, the class may vote to meet in a hotel banquet room, with the teacher leading the discussions surrounded by his pupils. The first hour is usually devoted to straight lectures by specialists in charge of the course, the second hour to questions and answers which generally come thick and fast.

The Alumni Are Satisfied

In a poll of ex-students, 99 out of every 100 said they believed courses should be offered again and again to their fellow businessmen. Eighty-six out of every 100 rated the courses as "good" to "excellent," while the other 14 considered them merely "satisfactory."

Senator Jacob K. Javits (R.-N.Y.), a member of the Senate's Select Committee on Small Business, calls the sponsoring of management training courses "one of S.B.A.'s most interesting activities. . . .

"The director, his associates and the staff of the S.B.A. are to be congratulated for trying to help and encourage small businesses and industries throughout the country in this way," Senator Javits declared in his Senate speech. "We need to do much more, but progress is being made. In my own state of New York, this program has been helpful to many hundreds of small-business operators, and its popularity is growing with each year. . . .

"As a result, two things are happening: First, educational institutions are now offering depth courses in specific subjects, such as the use of records for more profitable control. Second, many who have attended the classes are forming what might be called alumni associations with monthly or

Government-sponsored courses are being offered across the country to improve business skills.

This new kind of school may unlock doors for you.

SPECIAL INDUSTRY REPORT

quarterly meetings which bring the businessmen-students back together for further discussion and study on subjects of current, or prime, interest. One important reason for the success of this program is that the subject matter, which is determined locally and usually by an advisory committee, covers only administrative management."

Record Program Held Last Year

In the 1959-60 school year, ending June, administrative management courses cosponsored by the S.B.A. established a new annual record, with 220 offerings in all parts of the nation. The latest listing of such courses showed that businessmen were attending evening classes in such widely scattered institutions as Pennsylvania State University, Kansas State College, and Modesto (Calif.) Junior College.

Since the first two management courses were offered on a trial basis in the Spring of 1954, a total of 711 have been held in hundreds of colleges. So far, more than 25,000 businessmen have attended these classes. California educational institutions have cosponsored the greatest number of courses, but Virginia leads in enrollment and in the number of participating schools. These states, significantly enough, represent the West and South—two areas just beginning to flex their economic muscles.

Striving to analyze why businessmen, year after year, have been going back to school in such ever increasing numbers, an S.B.A. official in Washington, D. C., declared: "The lack of a well-rounded background in administrative management is a serious problem for small business owners and managers—and they are coming to realize it more poignantly all the time. Studies have shown that nine out of ten business failures can be traced directly to lack of experience or lack of aptitude for running a business.

"Through the Administrative Management Courses, the S.B.A. and educational institutions are working together closely to enable small business executives to learn more about how to solve the problems that confront them. The courses still represent a relatively new approach to the problems of small business concerns, but the enthusiastic response of businessmen and educators indicates that they are a practical and effective form of assistance."

Subjects taught include "The Managerial Function," "Personnel Relations," "Accounting and Taxes," "Increasing Sales," "Securing Capital," "Sales and Production Planning," "Current Management Problems and Practices," "Credit Policies and Insurance," plus many others. Because they focus on administrative management, rather than on day-to-day operations, the courses are open only to owners and managers. It is believed that most small-business executives know operating details well enough, but lack the opportunity and knowledge to gauge the importance of executive problems, especially planning, and learning the newest techniques available in the field of business administration.

Education to Order

If you happen to check with a large educational institution that is **not** sponsoring such a course at present, suggest to officials that they contact the S.B.A. about the feasibility of cosponsorship. Many courses have been started in just this way, with businessmen prompting the organization of new classes.

"Administrative Management," the official designation for these courses, refers to a concern with the over-all determination of major policies and objectives in a business. It pertains to policies associated with organizing, staffing, planning, directing and controlling. Although the training sessions are referred to generally as "courses," they are occasionally called "seminars," "institutes" and "conferences."

Courses are not formed by type of business. For example, a druggist might be one fellow student of a rubber specialty manufacturer, the owner of a large printing plant, another. To some extent however, classes are divided between executives interested in distribution and those in manufacturing. Opinions differ among educators about the desirability of tailoring a course to the needs of a specific group of businessmen in the same trade, or even about the sales-production cleavage. Students originally thought that specialized groups would be the most effective. As the program expanded, many however came to prefer mixed groups, as demonstrated by the following incidents:

In one course the practice of breaking down the class into specific types of businessmen was initiated after the first half of each session. Soon, many members requested that the separation be discontinued, because they found that retailers were interested in the reactions of manufacturers, while men in the service trades wanted to hear comments from producers and retailers. In another case, the owner of a manufacturing company felt that the lecturer had talked during the entire hour to him about problems peculiar to his business. Almost immediately, two other students, engaged in utterly dissimilar industries, made almost identical comments. They concluded that most executives had similar administrative problems, although their respective operating factors might differ.

As the courses multiply, it is expected that some of them **will** be held in specific fields, particularly if the educational institutions that sponsor the courses with S.B.A. are located in populous industrial areas, where there are hundreds of businessmen in prevailing types of industry.

A New Factor in Economics

Everything considered, the movement to greater academic management training represents one of the most vital trends in the U. S. economy today, particularly for the 95 per cent of businesses classed as "small," in contrast to their giant corporate cousins. As a matter of fact, the big businesses have been keen on buying brainpower for quite a while—paying high salaries to hire top men, and disbursing large fees to specialists handling specific tasks or supplying consultation services. This has been one of the biggest assets of big business in modern times.

Hence, the trend "back to school" for executives in the medium and small range may rid them of a handicap in industrial competition, much more effectively than specialists in economics have considered, when they foresaw greater and greater business concentration in the next few years.

EDITORIAL

An Open Letter to . . . .

Mr. William A. Patterson
United Air Lines, Inc.,
Chicago, Ill.

Dear Mr. Patterson:

► In your recent report to the stockholders of your company rather unflattering reference was made to the rubber industry. You stated that your company had a disappointing first quarter and explained that one reason for reduced revenues was the introduction of the new airplane, the DC-8. We understand that any new aircraft will have minor engineering difficulties, and the DC-8 has apparently been suffering its share.

You declared that in recent weeks you have had an opportunity to go over every part of the DC-8 that had been giving company engineers trouble. And then you stated: "I want to show you a rubber seal that costs about $3. (It should cost about 10 cents, but they charge us $3.) This is a seal in the hydraulic system of the airplane. This particular seal apparently started vibrating and moving and in the process there was wear in certain areas that developed a little leakage that showed up on the hydraulic gauge as a loss in pressure. The mechanic knows what loss of pressure means, he knows where the pressure system is. But there are 400 of these seals in the hydraulic system. The question is: which one is leaking? This little thing delayed a $5,000,000 airplane for almost five hours until it was found."

Mr. Patterson, we would not debate your explanation of your engineering difficulties, nor would we defend your indictment of a faulty rubber seal. We do take issue, however, with your parenthetical remark: "It should cost us about 10 cents, but they charge us $3." It seems to us that this statement is basically unfair.

This so-called 10-cent seal . . . of what rubber was it made . . . how much research went into its development . . . what compounding ingredients are involved . . . how much went into their development?

You imply that your company has been overcharged $2.90 on a 10-cent item, and we submit that this is hardly a fact. Do we, for our part, charge that an airline ticket between New York and Cleveland is $2.90 too high? On what basis would we make such a claim?

The rubber industry is a free enterprise, operating without subsidy in a free market. There are literally dozens of companies in the United States producing oil seals. If the engineering requirements for oil seals in the DC-8 are unique, the physical and chemical properties of the seals themselves are vital. For these reasons, we think that your reference to the cost factor is unfair.

It is the "human" thing to try to explain away business difficulties. In this case, however, to attribute even part of the financial difficulty to the rubber industry strikes us more as an exercise in rhetoric than logic. We will be pleased to publish any comments you may care to make on this subject.

Very truly yours,
Rubber Age

IRSG Sees World New Rubber Use of 3.86 Million Long Tons in 1960

► The Management Committee of the International Rubber Study Group has estimated the consumption demand for natural and synthetic rubber during 1960 at about 2,110,000 long tons of natural rubber, and about 1,750,000 long tons of synthetic rubber, apart from synthetic rubber produced in non-member countries. World production of natural rubber is estimated at around 2,135,000 long tons, and production of synthetic rubber in member countries at about 1,810,000 long tons, while total synthetic rubber production capacity in member countries is estimated at 2,335,000 long tons.

Sales from government stockpiles in the United States, the United Kingdom, and Italy up to the end of April for delivery this year were about 95,000 long tons. If the price of natural rubber remains somewhat above the level at which the United States and United Kingdom Governments have stated that they are free to sell unrestricted quantities of rubber, the Committee estimates that a further 75,000 long tons of natural rubber may be slated for delivery during 1960.

At the end of 1959 commercial stocks of natural rubber had reached an unusually low level. In the opinion of the Committee it will take a considerable part of a 1960 surplus to rebuild commercial stocks to a more normal level as the rate of consumption of synthetic rubber is apparently continuing its increasing portion of the market.

Table I — Estimated Natural and Synthetic Rubber Consumption in 1960

(in 1,000 long tons)

Territory	Natural	Synthetic	Total
United States of America	540	1,115	1,655
United Kingdom	170	100	270
Federal Republic of Germany	143	93	236
France	128	85	213
Japan	168	42	210
Canada	46	61	107
Italy	60	40	100
Australia	36	24	60
Czechoslovakia*	30	1	31
Netherlands	22	8	30
Belgium	15	11	26
Austria	11	10	21
Indonesia	15	—	15
Denmark	6	2	8
Hungary*	7	1	8
Federation of Malaya & Singapore	6	—	6
Thailand	1	—	1
Other Member Countries†	3	—	3
Other Countries	703	157	860
Total	2,110	1,750	3,860

* Estimated imports from Member Countries. † Belgian Congo, Burma, Cambodia, Ceylon, Liberia and Viet-Nam.

Table II — Estimated Natural Rubber Supply in 1960

(in 1,000 long tons)

Territory	Production
Indonesia	740
Federation of Malaya and Singapore	725
Thailand	175
Ceylon	95
Viet-Nam	76
British Africa	56
Sarawak	45
Liberia	45
Belgian Africa	42
Cambodia	36
Other British Borneo	26
Burma	12
States of the French Community	5
Territory of Papua and New Guinea	4
Other Countries	53
Total	2,135

Table III—Estimated Synthetic Rubber Production in Member Countries in 1960

(in 1,000 long tons)

U. S. A.	1,355
Canada	150
Other Member Countries	305
Total	1,810

PRG Hears White On Polymer Research

► "Important Scientific Advance in Polymer Research" was the subject of a talk given by Dr. Leland M. White (U.S. Rubber) before the Philadelphia Rubber Group at its technical meeting on April 29 at the Poor Richards Club in Philadelphia, Penna. The meeting also was Past Chairmen's Nite, during which all past chairmen of the group were honored.

In his talk, Dr. White stated that polymers, those chemical combinations of molecules which make possible synthetic fibers, plastics, and man-made types of rubber, will play an even greater role in the future lives of every person. He reported that the polymer industry, which became a major force as recently as the 1930's, is now growing at about twice the rate of the gross national product.

The director of research and development for U.S. Rubber remarked that research is giving us entirely new materials through atomic radiation, chemical grafting and new methods of polymerization. The quality of many products is being improved constantly through research on the chemistry and physics of raw materials, he added. Dr. White also pointed out that continued research by the polymer industry has brought about a 25 per cent reduction in the cost of synthetic rubber since private industry took over ownership of government plants in 1955.

The past chairmen honored by the Philadelphia Rubber Group included: R. S. Hanslick, 1945; W. B. Monroe, 1946; L. K. Youse (Kentile), 1947; W. B. Dunlap, Jr. (Lee Rubber), 1948; W. F. Abbey (R. T. Vanderbilt), 1949; T. J. Gorman (Quaker Rubber), 1950; H. J. Reid (U.S. Rubber), 1951; T. W. Elkin (R. T. Vanderbilt), 1952; G. J. Wyrough (Wyrough & Loser), 1953; A. J. DiMaggion (Firestone), 1954; M. A. Youker (DuPont), 1955; R. J. Salyerds (Harwick Standard), 1956; J. R. Mills (Goodall), 1957; R. A. Garrett (Armstrong Cork), 1958; and R. S. Graff (DuPont), 1959.

Acme Promotes Two

► Norman L. Freydberg has been elected president of the Acme Backing Corp., Stamford, Conn., replacing Ralph M. Freydberg who has been named chairman. The company makes coated textile and other products.

J. R. Nesbit

Joins International Latex

► Jean Rodger Nesbit has joined the Chemical Division of International Latex Corp., Dover, Del., as regional sales manager for the Middle Atlantic area. Mr. Nesbit, who will have his offices in Rumson, N. J., holds a B.S. degree in Chemical Engineering from Carnegie Institute of Technology. Before joining International Latex he was with Witco Chemical Co., U. S. Rubber Reclaiming, and Latex & Rubber, Inc.

G-E Silicone Expands

► The Silicone Products Department of the General Electric Co., located in Waterford, N. Y., is implementing an expansion program which will involve an outlay of several million dollars in new buildings, equipment and processes over the next two years. The program is aimed at boosting production capacity to 1963 demand levels for silicone products. First on the list is construction of a manufacturing facility for silicone fluids, dispersions, emulsions and specialty products which will add 15,000 square feet to existing facilities. The new manufacturing unit for fluid products is under construction and slated for completion in October.

New Long Mile Plant

► A new tread rubber manufacturing plant owned by Long Mile Rubber Corp., Dallas, Tex., is now in operation in Spartanburg, S. C. The plant has a capacity of 6,000 pounds of tread rubber an hour, bringing the company's total production capacity to over 13,000 pounds an hour. Warren Phillips, Jr., assistant vice-president of Long Mile, will manage the plant.

United Carbon Plant Initiates New Process

► A million dollar process equipment change-over has been initiated by United Carbon Co., Houston, Texas, in order to incorporate production of a series of new black masterbatch compounds which will provide faster tire production and improved road wear. The announcement was made by R. W. French, company president, who also told of a 50 million pound per year production capacity increase. "Basically the new United process provides far more exact production control," he said. "Testing on commercial equipment to date has indicated reduced mixing time and faster tubing. Indicated tread wear ratings average 10 per cent over conventional masterbatches on a one-pass mix."

The new masterbatch, the product of a three-year development program, was developed by Gerald M. Barclay, who was formerly an engineer at the company's Baytown plant. He is currently assigned to process studies in the Research and Development Department's pilot plant at Baytown. Several patents have been applied for on the new process which features elimination of the dispersing agent and salt coagulation. Patents pending relate to the coagulation step which is accomplished without using brine. The new masterbatch has extremely low ash, ensuring better aging and lower moisture absorption.

United Carbon's new service laboratory in Akron, Ohio, has been handling initial road tests and processing evaluations. The test program indicates that Banbury mixing produces less residual nerve which gives the customer more uniform extrusions and therefore less rejects.

A full scale pilot plant model of the new process has been under test for the past year and commercial plant runs have been made for the past three months. Full scale commercial production is now under way on three major tread stocks.

Massillon Elects President

► Robert E. Rummage, former executive vice-president and secretary, has been elected president of Massillon Rubber Co., a subsidiary of American Hospital Supply Corp., Evanston, Ill. He succeeds Herbert P. Croxton, retired. Walter P. Long was elected vice-president; Erwin G. Kuchel, treasurer; and Bushnell Fullerton, secretary.

General Wins Patent On Oil-Extended Tread

► General Tire & Rubber Co., Akron, Ohio, won its suit for a patent on an oil-extended rubber process for making tire treads, in a Federal District Court in Washington, D. C. The decision overruled the U. S. Patent Office's Board of Appeals which had rejected the company's bid for the patent. Annual royalties under the patent, some predict, could run as high as $42 million a year, for perhaps as high as 90 per cent of the tire treads made in this country utilize some oil-extended, high-Mooney cold rubber.

Another question is whether the Government could be held responsible for royalties or infringement liability incurred under the patent by the purchasers of the synthetic rubber plants owned by the Government until about 1955. Speculations on this possibility arose as a Government co-counsel of a Justice Department attorney appeared in court along with the Patent Office solicitor.

The question as to whether General's oil-extended rubber was patentable or not has been open ever since the company first applied for patent protection in 1950. At that time William F. O'Neil, then company president, offered the Reconstruction Finance Corp. the process for the reported figure of $65 million, only to have the proposal turned down.

Hydraulic Oil Principle

Although the principle of using hydrocarbon oil to process rubber has been known for some time, General, in attempting to obtain the patent, claimed that its product was new in that it used large amounts of hydrocarbon oils and rubbers of higher viscosity than were previously used. Judge Alexander Holtzoff of the District Court upheld this view, holding in addition that the discovery of the process was not obvious in the light of the prior art. Referring to a decision denying a patent to Phillips Chemical on a process for making the same rubber composition, Judge Holtzoff held that just because a process is not patentable does not mean that the product of that process is not patentable.

The possibility still remains open that the Government will appeal Judge Holtzoff's judgment, or that the validity of the patent will be questioned in an infringement suit.

A. J. Gracia

W. J. Lee

Named in Goodyear Development

► A realignment of functions to step up activity in product research and development at Goodyear Tire & Rubber Co., Akron, Ohio, has resulted in four new appointments. A. J. Gracia has been named director of general research and development, and W. J. Lee has been appointed director of tire research and development. In addition, M. J. De France, former director of the New Products Department, has been appointed manager of commercial development, a newly created post, and J. A. Merrill, has been elevated from associate director of research to assistant director of the organization.

Mr. Gracia, manager of research and development since 1956, will have responsibility for all research, product development and product service functions affecting all materials, new products and existing end products other than tires. He joined Goodyear in 1928 and prior to 1956 was for four years general manager of the Goodyear-operated, government owned gaseous diffusion plant near Portsmouth, Ohio.

Mr. Lee, former director of tire engineering, assumes responsibility for all research, product development and product service functions directly affecting tires and related products. He has been occupied with tire design and engineering projects during most of his 38 years at the company. For eight years he was Goodyear's resident engineer at Detroit.

FTC Disapproves Merger

► The Federal Trade Commission has ordered A. G. Spalding & Bros., Inc., to give up Rawlings Manufacturing Co., a competing sporting goods manufacturer it absorbed in 1955, on the grounds that the merger violated the Clayton Antitrust Act. The FTC held that Spalding and Rawlings competed sharply prior to the merger, especially in the sale of higher quality goods. According to the FTC, Rawlings was, at the time, showing "rapid growth and expansion," and its elimination as a separate company removed from the market "a substantial competitive factor."

Veiock Promoted at Lee

► Theodore I. Veiock has been named plant manager of the Lee Division of Lee Rubber & Tire Corp., Conshohocken, Penna. Before joining the Lee organization in April, 1959, as assistant to the president, he was at the Firestone Tire and Rubber Co. plant in Des Moines, Iowa, where he was employed as assistant chief chemist and manager of the rubber preparation, mass and milling, calendering and tubing, and final inspection departments. Mr. Veiock graduated from Geneva College, Beaver Falls, Penna., receiving his B. Sc. in 1942. He is a member of the Philadelphia Rubber Group.

N.Y. Rubber Group Holds Summer Outing

► Over 225 members and guests attended the June 9 Summer Outing of the New York Rubber Group, which was held at Doerr's Grove in Millburn, N. J. Highlight of the day's activities was an Enneathlon Contest, won by Joe Brandi (Cooke Color) who amassed a total of 37 points in the nine contest events. Grand prize for the Enneathlon winner was two round-trip airplane tickets to Bermuda. Runners-up in the Enneathlon, all with over 30 points, were: Bill Lamela (Okonite); W. T. Brahmstead (Firestone Synthetic); Dom Christiano; Ken Chester (C. P. Hall); John Kuchar; Bill Downey (Thompson, Weinman); Gordon Voigt (Niagara Rubber); John Dunn (Thiokol); Mat Malkiewicz (Raybestos-Manhattan); John Peters (Columbian Carbon); and Nick Relo (Cooke Color). Points were awarded to contestants who placed first, second and third in each event.

Individual Enneathlon event winners were: *Ball in Barrel*, C. J. Moran (Textile Proofers); *Hit the Bottles*, W. T. Brahmstead (Firestone Synthetic); *Bocci*, Joe Brandi and Nick Relo (Cooke Color); *Quoits*, Bill Lamela (Okonite); *Golf Putting*, E. White (National Lead); *Basketball Throw*, Joe Brandi (Cooke Color); *Fly Casting*, J. Callan (Columbian Carbon); *Dart Throwing*, Bert Wilkes (Godfrey L. Cabot); *Egg Throwing*, Bob Daley (Columbian Carbon).

Activity Heads

Bryant C. Ross (Pennsalt) served as general chairman of the Outing Committee. Chairmen of the various activities were: *Ball in Barrel*, Ralph Ambrose (Rodic Chemical and Color); *Baseball*, Al Gessler (Esso Research); *Hit the Bottles*, Leon Werling (Raybestos - Manhattan); *Bocci*, Glen Vickery (General Tire); *Quoits*, Bill Lamela (Okonite); *Golf Putting*, Dick Glidden (Ames Rubber); *Basketball Throw*, Gordon Voigt (Niagara Rubber); *Fly Casting*, Bob Lukacik (Pennsalt); *Dart Throwing*, Hank Pryor (R. E. Carroll); and *Egg Throwing*, Bill Hartmann (Laurie Reclaiming).

Plenty of food and refreshments, including chowder, clam broth, clams, hot dogs, beer and soft drinks, were served all afternoon, and dinner consisted of a roast beef plate with all the trimmings.

Washington Group Elects New Officers

1960-1961 Washington Rubber Group officers elected at the May 19 meeting in Pepco Auditorium, Washington, D. C.: Sitting, left to right, Vice-President, George Flanagan (Goodrich Chemical) and President Philip Mitton (Army Engineers); Standing, left to right, Treasurer, George Richey (Bureau of Standards) and Secretary, Dan Pratt (Bureau of Ships).

Enjay Realigns Sales Operations

► The Enjay Chemical Co., New York, N. Y. has re-organized its sales areas, and announced four new appointments. C. J. G. Leesemann, former acting manager of chemical marketing operations for the Humble Division of Humble Oil & Refining Co., the parent organization, has been named manager of the new Western Division. A Houston sales district has been created within the Western Division, and D. G. Bunnell, who also served with the Humble Division, has been named the district manager. Mr. Bunnell's staff will include E. D. Shannon and O. B. Taylor, technical sales representatives, and J. R. Duffy, marketing assistant, both formerly with the Humble Division. The Western Division with headquarters in Houston includes the West Coast sales district and the Tulsa, Okla., office.

Foster Grant Plans Plant

► A multimillion dollar polyethylene plastic plant will be built by Foster Grant Co., Leominster, Mass., at an undisclosed location. The company will eventually manufacture polypropylene, polybutylene and other plastics made from petroleum at the plant.

Two Elected at Motch To Vice-Presidencies

► Alvin J. Jones and D. M. Hallier have been elected vice-presidents of the Motch & Merryweather Machinery Co., Cleveland, Ohio. In his new capacity Mr. Jones will be manager of the Machine Tool Manufacturing Division at the Euclid plant of the company, and Mr. Hallier continues as manager of the Cutting Tool Manufacturing Division and the Allied Products Division. Mr. Jones joined the company in 1957 as director of engineering. In 1959 he was promoted to the post of director of engineering and manufacturing, and he now assumes responsibility for all operations of the division. Mr. Hallier joined the company in 1949.

McPherson Honored

► The Honor Scroll of the Washington chapter of the American Institute of Chemists has been awarded to Dr. Archibald T. McPherson, associate director of engineering of the National Bureau of Standards. He was honored for "his unselfish devotion to the encouragement of young scientists and his significant contributions in the national interest through his leadership in the calibration and specification activities of the National Bureau of Standards."

Trans-4 Introduced By Phillips Chemical

► With the commercial development of its *cis*-polybutadiene successfully launched, Phillips Chemical Co., Akron, Ohio, has been devoting more time to Trans-4, trade name given the company's high *trans*-polybutadiene. Phillips sees the two products as forerunners of a whole new line of stereo-specific polymers and copolymers. The high *trans*-polybutadiene rubber is being made by the company with a solution process that turns out a product with about 90 per cent *trans* content. The operating conditions and exact catalyst used are being kept secret by Phillips.

Synthetic high *trans*-polybutadiene is said to resemble the natural *trans*-polyisoprene rubbers, balata and gutta percha, in many of its properties. It has, according to Phillips, high hardness and tensile strength, excellent resilience, and abrasion resistance. Trans-4 has properties of both rubber and plastic. At room temperature it is hard, resin-like, and has a crystalline structure. Since it is thermo-plastic it can also be mixed, milled and extruded in conventional cross-linking agents such as sulfur and peroxides and the vulcanized product varies from a hard, inelastic material to one that is soft and rubbery, depending upon cure.

Natural *trans*-polyisoprene rubber supplies are short at this time, and Trans-4 is expected to find a market in the manufacture of golf ball covers in spite of the high cost of the rubber. In other potential markets, such as shoe soles and floor tiles, cost is a major drawback at this time as Trans-4 cannot compete with the low price of butadiene styrene rubbers.

Huber Expands Black Plant

► The Carbon Black Division of J. M. Huber Corp., New York, N. Y., is building two extra units to expand the capacity of its carbon black plant at Eldon, Texas, to an additional 60 million pounds per year. One unit is for production of Intermediate Super Abrasion Furnace Black, and the other is for Fast Extruding Furnace Black and General Purpose Furnace Black. The ISAF unit is scheduled to be completed about December 1 of this year, and the other, about January 1, 1961, at a combined cost of about $2½ million.

R. J. Wolf

Named by Goodrich

► Dr. R. J. Wolf has been named director of development for B. F. Goodrich Chemical Co., Cleveland, Ohio, succeeding Antone Vittone, Jr., who has been promoted to the post of general manager of plants. In his new position Dr. Wolf will be responsible for operations of the company's development center at Avon Lake, Ohio. Dr. Wolf received his Ph.D. in Chemical Engineering from Case Institute of Technology in 1942 and taught at Princeton University. He joined B. F. Goodrich Chemical in 1946, and was appointed development superintendent of the products application laboratory in 1952. In 1954 he was named to head development activities at Avon Lake.

New ASTM Committee

► Committee E-17 on Skid Resistance, a recently formed ASTM Committee, will utilize standard surfaces of known slipperiness in a new approach to skid-resistance measurement. The committee's primary task will be to develop standard test vehicles and standard surfaces for calibration purposes. The scope proposed by the Steering Committee is: (1) To develop and standardize field and laboratory methods of test for determining (traffic) surface slipperiness: (2) To develop and standardize methods of test for the use of a set of standards of surface slipperiness; and (3) To stimulate research to accomplish objectives (1) and (2). The organization meeting of the committee will be held during the 1960 ASTM annual meeting in Atlantic City, N. J., to be held from June 26 to July 1.

Synthetics Stressed In Soviet Planning

► About $25 billion will be invested in chemical facilities by the Soviet Union during that country's current Seven Year Plan, which will run through 1965, and about $12 billion of this amount is earmarked for synthetic rubber, plastics, and fibers. Almost everywhere behind the iron curtain emphasis will be placed on increasing the output of synthetic plastics, fibers, and fertilizers. Investment in capacity for synthetic materials will exceed the investment in the chemical industry during the last plan period.

According to a United Nations report, East Germany will retain first place after the Soviet Union as a producer of synthetic plastics and fibers. Synthetic rubber production will be introduced during the plan period in Czechoslovakia; it was started in Poland in 1959. Much of the expansion of East Germany's chemicals production is to be directed toward export markets, and total chemical exports are expected to double during 1958-65. Increases in chemical production exceeding the rates in any other industrial sector are foreseen in the Hungarian plan. Among the 1965 targets for output of individual products in Poland is a particularly high rate of growth set for rubber and plastics production.

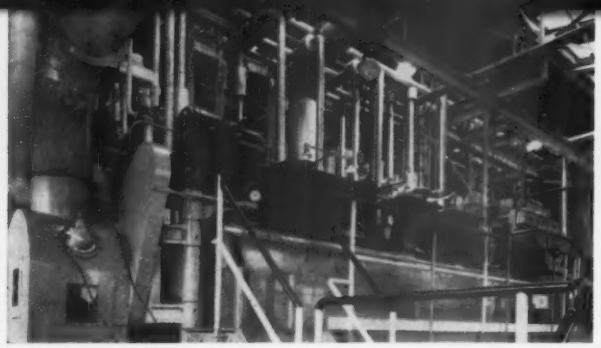
The main elements in the chemical expansion programs are made possible by rising imports of oil and natural gas together with exploitation of available domestic supplies.

McNeil to Buy Myers

► Stockholders of F. E. Myers & Bro. Co., Ashland, Ohio, have voted to sell all assets of the company to McNeil Machine & Engineering Co., Akron, Ohio, for $11,869,740. Myers, producer of water pumps, sprayers, water conditioners and allied items, will be operated as a McNeil subsidiary by its present management. McNeil is paying $60 a share for Myers stock and is assuming all liabilities except expenses of the sale, and any income taxes due in excess of reserves.

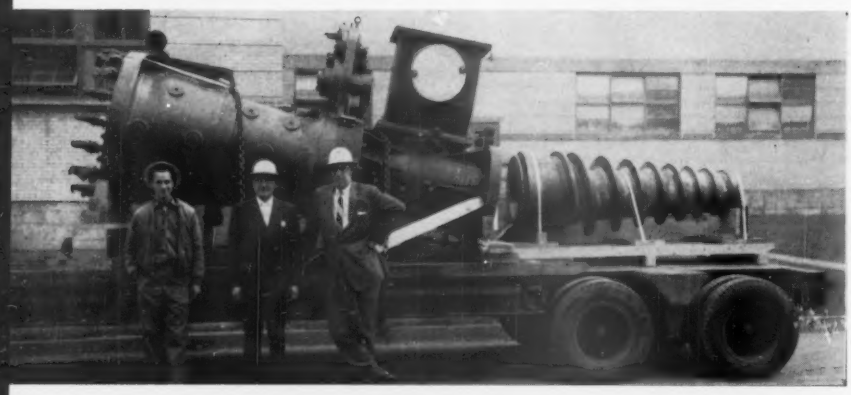
Barry Named Distributor

► The Industrial Division of Barry Controls, Inc., Watertown, Mass., has been appointed national distributor for the line of industrial mountings for vibration, shock and noise control manufactured by U. S. Rubber Co., New York, N. Y.



Extruder-Dryer

Produces polymer with



◄ OUTSIZE CONICAL SCREW and housing checked in by (L to R): R. Ralph (Girdler Co.), B. Holz (Nat'l. Rubber Mach.) and H. E. Phelps (Goodrich-Gulf).

◄ PELLETING DIE, hinged for easy cleaning, receives rubber from extruder.

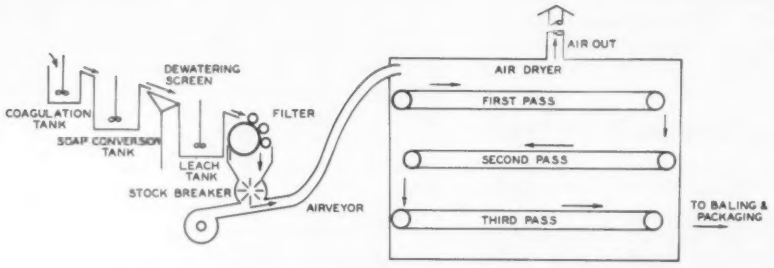
► At Institute, West Va., an extrusion dryer, the first full-scale model in the rubber industry, is now turning out low-ash styrene polymers at a rate of 6,000 to 8,000 lb. per hour for shoe soles, floor tile, tire stock, wire and cable applications. The 50-ton, 40-foot-long unit, costing $750,000, promises significant reductions in operating and maintenance cost, and substantial upgrading of product quality, according to Goodrich-Gulf Chemicals, Inc.

The machine has an 800-h.p. induction motor which drives a 4-foot-long conical screw. Wet crumb rubber passes from the leaching tanks, over a vibratory screen and through a feed box, to reach this screw. Operating at a maximum of 55.5 rpm, the screw pushes the wet rubber down to an adjustable, sliding cylinder valve, squeezing out about 80 per cent of the moisture from the crumb.

Linked to the end of the tapered screw is a straight, 12-inch diameter, 22-foot-long, multi-flight screw, which moves the rubber to a series of three vacuum chambers where remaining moisture is flashed off to standard specification (0.05 per cent). In the final extrusion stage,

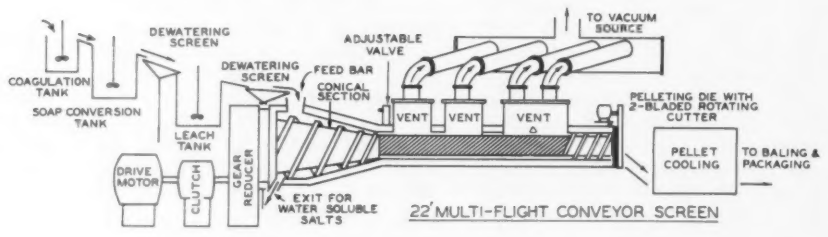
OLD METHOD →

Conventional three-pass forced-air dryer.



NEW SYSTEM →

Extruder-dryer in use at W. Va. plant of Goodrich-Gulf.



Handles 4 Tons of Rubber an Hour

low ash for tires, flooring, footwear, wire and cable goods

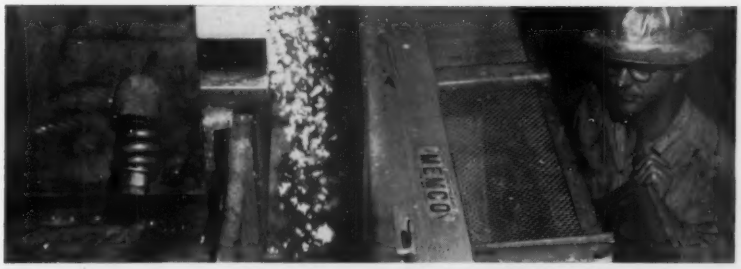
rubber is forced by the conveyor screw through a round pelleting die. The outside of the die is swept by a rotating, double-bladed knife that slices off strands of emerging dry rubber before it is cooled, baled and shipped.

Central Control Panel

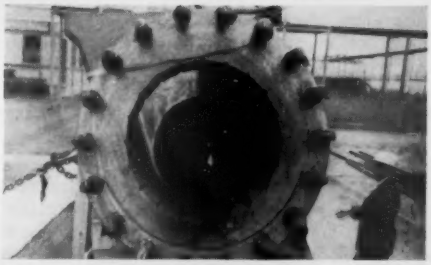
A complex system of temperature and pressure pickups has been placed at strategic points throughout the unit to monitor feed rate, dryness tolerance and machine safety factors from a central control panel, set for each type of polymer in process. The machine has been used primarily to produce rubbers with low viscosity, since it generally lowers Mooney ratings 4 to 6 points from those of conventional methods.

To house its massive new extrusion dryer, Goodrich-Gulf erected a building with extra-heavy foundations. One end was left detachable, permitting removal of the screw section. Because of minute tolerances required, a trolley was installed to transport the screw from the housing.

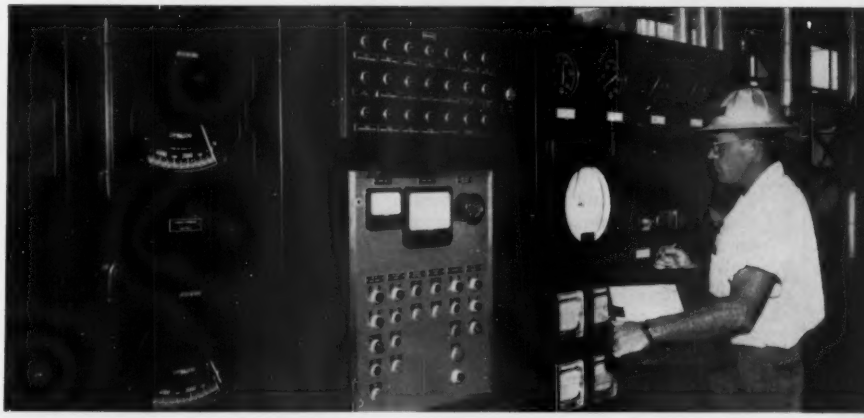
The new system is expected to cut production time and power loads. It also "cleans itself," thus avoiding contamination of polymers with residue from earlier runs. This should mean greater product uniformity, plus the elimination of "wet spots" in extrusion-dried styrene rubbers.



◀ MOISTURE-LADEN STYRENE rubber crumb drops through vibratory screen to feed box of dryer.



Exterior view of 4-foot long CONICAL SCREW showing 3-foot base diameter, tapering to 1 foot. ▶



CENTRAL CONTROL PANEL monitors entire operation: ◀ temperature, pressure pickup, motor operation and automatic shutoff.

▶ WORKMEN INSERT cylindrical conveyor screw into dryer housing through detachable wall of extruder building.

Rubber Goods Exhibited At 5th Design Engineering Show

► Over 20,000 engineers and executives from 20 nations attended the 5th Annual Design Engineering Show on May 23 to 26 at the New York Coliseum in New York City. The show, produced by Clapp & Poliak, New York, N. Y., was held concurrently with the Design Engineering Conference, which was sponsored by the Machine Design Division of the American Society of Mechanical Engineers. Over 10,000 products were displayed by 430 exhibiting companies.

Technical experts from these companies gave advice, answered questions, demonstrated new materials and processes, distributed technical data, supplied samples of new products and conducted performance tests. The exhibits were arranged to provide maximum interest and value to those attending the show. The exhibit groupings were: mechanical components; metals; non-metallic materials; adhesives and fasteners; finishes and coatings; hydraulic and pneumatic components; and engineering equipment and services.

The Design Engineering Conference featured panel discussions and talks on such subjects as new horizons in engineering design; reliability; fabrication; hydraulics; control systems; materials; automation; and the use of computers in design.

Company products were exhibited on all four floors of the Coliseum with a number of firms displaying rubber products. A high temperature conductive and shielding gasket material called Alu-Flex H.T. was featured by Auburn Mfg. Co., Middletown, Conn. This gasket is a flexible silicone rubber impregnated aluminum wire cloth material especially developed for maximum RF shielding and pressure sealing qualities. The temperature range of Alu-Flex H.T. is said to be from —65° to +500°F.

A.P.M. Corp., Yonkers, N. Y. displayed examples of its line of high pressure, vibration resistant seals and fasteners for military, commercial, marine and industrial applications. These materials, which are marketed under the tradenames of Hexseals, Seelskrews, Seelbolts, Seelrivits and RubRglass-Seels, are made of, or equipped with, silicone rubber.

Extruded parts of rigid and semi-rigid nature were featured by Conneaut Rubber and Plastics Co., Conneaut, Ohio. These extrusions were shown in formulations of polystyrene, styrene rubber copolymers, nylon, linear polyethylene, polypropylene and rigid polyvinyl chloride.

Dayton Industrial Products Co., Melrose Park, Ill., displayed its line of variable speed V-belts, cog belt, molded products and new Poly-V drives. The Poly-V employs a single, endless parallel V-ribbed belt running in sheaves designed to mate precisely with the belt ribs. The molded rubber goods featured rubber-to-metal, rubber-to-fabric, synthetic rubber and molded urethane items.

The exhibit of Dow Corning Corp., Midland, Mich., illustrated how silicones simplify design. One application shown was valve covers made of silastic for use in missiles, said to resist the deteriorating effects of liquid oxygen. Silastic RTV, a fluid silicone rubber, also was featured at the exhibit. This silicone product vulcanizes at room temperature and is reported to be easy to use in making flexible molds for accurate reproduction of prototype or production parts.

A portion of the DuPont booth was devoted to the Elastomer Chemicals Department, which displayed examples of products made with such synthetic rubbers as neoprene, Hypalon, Viton and Adiprene L.

The display of Enjay Chemical Co., Linden, N. J., was devoted to two of its newest materials, butyl rubber and Escon polypropylene. Examples of products produced with each material were shown.

Shows Seal Line

Garlock Packing Co., Palmyra, N. Y., displayed its line of Mechanipak seals, Lattice Braid packing and silicone products. Lattice Braid packings made with Teflon, asbestos, flax and cotton were shown. Products made with silicone rubber compounds included diaphragms, gasketing, sheet packing, oil seals, rings, insulation tape, rod and valve stem packings, and molded, extruded, die-cut and metal bonded shapes for various uses.

A number of synthetic rubber packings, oil seals, O-rings and precision molded products were on display at the booth of International Packings Corp., Bristol, N. H. The products shown were made of a variety of synthetic rubbers, such as nitrile rubber, neoprene, butadiene-styrene rubber, butyl, silicone, Hycar PA, Thiokol, Hypalon and Teflon.

Mountings, joints, suspensions and couplings, designed for vibration, shock and noise control, were exhibited by Lord Manufacturing Co., Erie, Penna. The major features of these items were the specially compounded elastomers and Lord's rubber-to-metal bond.

Mechanical Rubber Products Co., Warwick, N. Y., displayed its line of industrial parts fabricated with such rubber as silicone, buna-n, buna-s, butyl Hycar, Hypalon, Kel-F, and neoprene. These parts included gaskets, channels, connectors, diaphragms, packing, tubing and washers.

Latest developments in urethane foam production technology and end-use applications were exhibited by Mobay Chemical Co., Pittsburgh, Penna. Displayed were a variety of sample parts for use in the automotive and packaging fields.

Industrial rubber products, featuring its new Poly-V Drive J, were shown by Raybestos-Manhattan, Inc., Passaic, N. J. Other products shown were V-belts, transmission belts, conveyor belts, and air, water, steam, petroleum and special purpose hoses.

Examples of its custom molded hard rubber items were displayed by Stokes Molded Products, Trenton, N. J. On display were industrial items made from Stokohard and Stokotherm hard rubber and Stokolite and Stokoflex resin rubber.

A new group of elastomers, called Uscothane, was introduced by U. S. Rubber Co., New York, N. Y. Items such as carrying cases and typewriter cases, made of Uscolite, were displayed. Also on display were such custom made products as protective boots, air ducts, connectors, tubes, adapter tubes, bellows and industrial vacuum-cleaner hose.

Tamms Representatives

► The Thompson-Hayward Chemical Co. offices in Minneapolis, Minn.; Kansas City; and Memphis, Tenn.; have been named representatives for Tamms Industries Co., Chicago, Ill. Previously the New Orleans, La., office of Thompson - Hayward represented Tamms.

English Symposium Speakers Announced

► The second International Synthetic Rubber Symposium, to be held in conjunction with a rubber exhibition, will take place October 11 to 13 at Church House, Westminster, London, England. Among the speakers and their topics will be: Dr. W. W. Crouch (Phillips Petroleum), "New Controlled Structure Polymers of Butadiene"; Dr. E. F. Engel (Chemische Werke Huls), "Polybutadiene Rubber"; Dr. L. H. Howland, E. J. Aleksa, Dr. R. W. Brown, and E. L. Borg (U. S. Rubber), "High Solids SBR Latex by a Chemical Promoted Agglomeration"; A. R. Payne (Research Association of British Rubber Manufacturers), "The Dynamic-Mechanical Properties of Filler-Loaded Vulcanizates"; R. L. Marlowe, R. F. Miller, J. L. Ginn (Goodrich), "Tread Wear Indices of Various Synthetic Elastomers Measured in Varying Severity Road Tests."

Also, Prof. Giulio Natta, "Vulcanization and Elastomeric Properties of Ethylene-Propylene Copolymers"; Dr. F. P. Baldwin (Esso Research), "Preparation and Properties of Chlorobutyl"; P. C. Servais (Dow Corning) and Dr. I. H. Riley (Midland Silicones), "Silicone Rubber Compounding"; H. A. Pfisterer and I. W. E. Harris (Polymer Corp.) "Modern Nitrile Rubber Technology"; G. T. Perkins, Dr. J. F. Smith (DuPont), "The Chemistry and Vulcanization of 'Viton' Fluoroelastomers"; R. E. Headrick (Wright Air Development), "Elastomers for Advanced Design Flight Vehicles." Dunlop Rubber Co. Ltd. will present a lecture on "Rheological Properties of *cis*-Polybutadiene and Other Polymers."

Lecture Sessions

Lecture sessions will run from 9 a.m. to 5 p.m. daily. A cocktail party will be given by Dunlop Rubber Co. at 6 p.m. October 11. At 7:30 p.m. of October 12 there will be a formal dress official Symposium dinner at the Savoy Hotel for the delegates and their ladies. At 6:00 p.m., October 13, Shell Chemical Co. will give a cocktail party. Symposium tickets may be purchased from *Rubber & Plastics Age*, Gaywood House, Great Peter St., London, SW. 1, England, sponsors of the symposium.

Neville Holds Sales Meeting

Neville Chemical Co., Neville Island, Pittsburgh, Penna., recently held its semi-annual sales meeting during the week of April 25 at the firm's Neville Island office and research center. In attendance was the Neville technical sales staff as well as home office marketing management and staff. Although the conference was conducted on an informal round table discussion basis, several excellent dissertations were given by Neville scientists and chemists on the fine points of current technical developments. The balance of the clinic was devoted to various sales problems and the subject of Neville's constant endeavors to improve assistance to customers. The above photograph shows the sales group that attended the meeting. Standing, left to right: Charles N. Beck, technical correspondent; E. Glenn Isenberg, general sales manager; James Driscoll, advertising manager; James B. Steen, William Craig, Dale F. DeBlander, John P. Villing and Donald L. Marsh, technical representatives; and Walter F. James, export manager. Kneeling, left to right: David N. Clark, William T. Cloake and W. J. Williams, technical representatives.

Seiberling to Diversify

► The acquisition of the Tread Rubber Division of Gutta Percha & Rubber, Ltd., Toronto, Ontario, Canada, rubber manufacturer, was announced at the stockholders' meeting of the Seiberling Rubber Co., Akron, Ohio. Also announced were plans to organize a new United States subsidiary to make and sell a "direct-line" passenger tire at a low delivered price, a market described by J. P. Seiberling, president, as "completely untapped." The company president said engineering studies were under way for a new tire plant, "probably west of the Mississippi," to provide added capacity for Seiberling brand tires and for the new subsidiary.

Statements touching on the need to diversify in the face of highly competitive replacement tire business were interspersed by bitter attacks on company policy by Edward O. Lamb, major stockholder and director who four years ago tried to take over control of the company. At the meeting stockholders learned that the company sustained a loss for the quarter, although Mr. Seiberling assured them that results for the year should be "not less than the level of 1959," when the company reported its best earnings for any peacetime year.

Columbian Elects Two

► George P. Bunn, Jr., has been elected vice-president, and Harry D. Page has been elected secretary of the Columbian Carbon Co., New York, N. Y. Mr. Bunn, who will have his headquarters in New York, will be in charge of all of the company's domestic and Canadian oil and gas operations and allied processing activities. He was at the company's divisional office in Houston, Tex., from 1949 to 1958, and has been general manager of the Mid-Continent Oil and Gas Division for the past two years.

Mr. Page succeeds Frederick H. Stokes, who continues as a member of the board of directors and as general counsel. Mr. Page joined Columbian in 1959 as general attorney.

German Rubber Conference

To Be Held in Berlin, October 4-8

▶ An advance edition of the program for the International Rubber Conference, to be held October 4-8 in West Berlin's new "Kongresshalle," lists more than 60 technical papers for presentation, plus a host of special events closing with a gala social evening at the "Palais im Funkturm."

On Tuesday, October 4, the Conference will open with a reception for the international press, a business meeting of the German Rubber Association and a reception for guests of honor by the City Council of West Berlin. The next day, delegates will be greeted by the Mayor of West Berlin. Following award of the Carl-Dietrich-Harries Plaque, a general session chaired by G. Fromandi (Leverkusen, Germany) will hear two papers: "The Development of Synthetic Rubber Since 1930," by P. Baumann (Marl-Huels, Germany), and "The Development of Synthetic Fibers for Industrial Use" by A. Ebert (Wuppertal-Elberfeld, Germany).

The following technical papers have been scheduled:

Wednesday, Oct. 5: "Elastomers —Part I," O. Giese (Fulda, Germany), presiding: "Diene Rubber: A Linear Polybutadiene," G. Alliger, B. L. Johnson and L. E. Forman (Akron, Ohio); "Development and Significance of Polybutadienes," F. Engel, (Marl-Huels, Germany); "Copolymers of Ethylene-Vinyl Acetate and Their Cross-Linkage," H. Bartel and J. Peter (Leverkusen, Germany); "Dynamic Properties of Ethylene-Propylene Copolymers," G. Natta, G. Crespi and M. Bruzzone (Milan, Italy); "Initial Application of a New, Highly Elastic Ethylene-Propylene Polymer," C. Canevari and A. Morando (Milan, Italy); "Butyl and Its Areas of Application," G. Klotsch, M. Langcheck, W. C. Smith and R. L. Zapp (Linden, N. J.); "Investigations into the Micromorphology of Elastomers with the Electron Microscope," Th. G. F. Schoon (Wuerzburg, Germany).

"Synthetic Fibers," E. Pieper (Wuppertal-Elberfeld, Germany), presiding: "Some Relationships Between Static and Dynamic Properties of Tire Cords," G. Kemnitz and G. Espanion (Cologne, Germany); "Conducting Measurements of Tire Cord in Rubber and Evaluating the Results," J. K. van Wijngaarden (Arnhem, The Netherlands); "Modern Viscose Tire Cord in Tires," F. B. Breazeale, American Enka Corp., (New York, N. Y.); "A New Dielectric Process for the Quick Determination of Tire Cord Moisture Content," E. Haase-Deyerling and H. Meumann (Hanover, Germany); "Nylon in Tires," H. G. Lauterbach (Wilmington, Del.); "Test and Evaluation Procedure for Fatigue of Tire Cords in Tires," Z. Bartha (Budapest, Hungary); "A New Device for Efficient Adhesion Measurements," O. K. F. Bussemaker (Amsterdam, The Netherlands).

Thursday, Oct. 6: "Vulcanization — Part I," C. Breunger (Hanover, Germany) presiding: "Kinetics of Thermal Vulcanization of Synthetic Rubbers and the Influence of Additives," W. Scheele (Hanover, Germany); "Investigations Into the Activating Energy of Vulcanization," A. Franck, K. Hafner and F. W. Kern, (Munich, Germany); "Sulfur Group Analyses in Natural Rubber Vulcanizates. II. Application to Mercaptobenzothiazole Accelerated Stocks," M. L. Studebaker (Akron, Ohio); "On the Beginnings of Scientific Research Into Natural Rubber," F. Kirchhof (Neulussheim, Germany); "Diffusion of Sulphur S^{35} in Rubber," H. Auler (Aachen, Germany); "Possible Uses for the Polarograph in the Rubber Laboratory and Special Analytical Methods to Clarify Vulcanization Processes," F. Mocker and I. Old (Hoechst, Germany); "Vulcanization of Ethylene-Propylene Copolymers With Peroxides," E. DiGiulio and G. Ballini (Ferrara, Italy).

"Testing Part I," W. Stegemann (Hamburg, Germany), presiding: "The Modulus and Resilience of Polymers in Gum and Black Loaded States and the Effect of Temperature, Frequency and Amplitude of Deformation on These Properties," D. Bulgin, G. D. Hubbard and H. Schilling (Birmingham, England); "The Dynamic Properties of Black Loaded Polymers at Amplitudes of Deformation Below One Per Cent," D. Bulgin and T. Lamming (Birmingham, England); "New Methods for the Testing of Rubber Vulcanizates," R. Clamroth and R. Ecker (Leverkusen, Germany); "Recent Abrasion Studies Based on the Dunlop - Lambourn Principle," D. Beckmann (Fulda, Germany); "Contribution to the Dependence on Temperature of Elastic Constants for High-Polymer Materials," F. W. Backes (Munich, Germany); "Cold Testing Method for High Polymers," O. Umminger, (Marl-Huels, Germany); "IR-Hardness, Microhardness and Shore-Hardness," F. Haendler and P. Kainradl (Vienna, Austria).

"Special Tire Subjects," W. Kraemer (Hanau/M., Germany) presiding: "Improved Tire Performance With Synthetic Rubber," A. Loulan (Akron, Ohio); "Cord Paths In Tyres," V. E. Gough (Birmingham, England); "Further Studies of Deformation Measurements with Stretching Devices on Tires During Inflation and Deflation," F. W. Kern, K. Hafner and H. Nippold (Munich, Germany); "The Origin of Tire Squeal," R. F. Miller and J. G. Slaby (Brecksville, Ohio); "The Radial Stiffness of the Pneumatic Tyre," D. H. Cooper (Birmingham, England).

"Elastomers—Part II," W. Klein (Marl-Huels, Germany), presiding; "Regarding Quantitative, Infrared, Spectroscopic Determination of Rubber Isomers," T. Kimmer (Schkopau, Germany); "Identification and Quantitative Determination of Elastomers in Rubber," H. Feuerberg (Berlin-Dahlem, Germany); "Measurements of Specific and Latent Temperatures in Rubbers," F. H. Mueller (Marburg, Germany); "Capillary Rheometry as a Method for Predicting the Processability of Neoprene," C. C. McCabe, N. N. Mueller and E. K. Ott (Wilmington, Del.); "Identification of Small Quantities of Monomers in Latex," J. Brodsky (Gottwaldov, Czechoslovakia).

Friday, Oct. 7: "Fillers and Vulcanization — Part II," D. Schmidt (Frankfurt a/M, Germany), presiding: "Reinforcement of Rubber by Carbon Black and High-Energy Radiation," A. Lamm and G. Lamm (Paris, France); "Investigations into the Reinforcing Action of Fillers in Vulcanizates," F. Glander (Hanover, Germany); "The Question of a Re-

lationship Between Physical and Chemical Buildup of a Siliceous Acid and Its Elastomeric Properties," W. H. Albrecht (Dueren, Germany); "Role of Carbon Structure in the Reinforcement of Rubber—The Effects of Lowered Structure," C. W. Sweitzer (Princeton, N. J.); "Experiences with Carbon Black Filled Rubber," P. Bernemann (Marl-Huels, Germany); "Vulcanization of Natural and Synthetic Rubbers with Resins," C. Thelamon (Paris, France); "Phenols as Vulcanizing Agents," A. Giller (Wiesbaden, Germany).

"Technology and Production," H. Hellwage (Munich, Germany), presiding: "Researches Into Productivity Measurement in the Rubber Industry," W. C. Wake, (Shawbury, England); "Concerning a Spiral Flow with Helically Extruded Goods," S. Eccher (Milan, Italy); "On the Durability of Belting Samples in Relation to Defined Defects," A. Matting (Hanover, Germany); "An Economical Process for Preparation of Rubber Latex," A. Sila and J. Levecque (Paris, France); "Properties of Vulcanizable Systems of Rubbers from Thermoplastics," Ch. L. Bryant (Welwyn Garden City, England); "New Bases for Specifications of Rubber Drive Belts," K. H. Bussmann (Berlin-Dahlem, Germany).

"Aging," W. Scheele (Hanover, Germany), presiding: "Oxidative Stress Relaxation Studies of Radiation - Cured Vulcanizates With and Without Antioxidant," J. R. Dunn (Welwyn Garden City, England); "Antiozonants in Oil-Extended Rubber," Th. Kempermann and R. Clamroth (Leverkusen, Germany); "Aging Behaviour of Butyl Vulcanizates," D. C. Edwards (Sarnia, Canada); "Oxidation of Unsaturated Elastomers," E. M. Bevilacqua, (Wayne, N. J.); "The Mechanism of Ozone Cracking of Rubbers," A. N. Gent (Welwyn Garden City, England).

"Elastomers—Part III" and "Testing—Part II," P. Stoecklin (Leverkusen, Germany) presiding: "The Effect of Piperidine on Rubber Solutions," A. Soininen (Helsinki, Finland); "Variability in Synthetic Rubber Supplies," C. J. A. Hael and M. G. Peakman (Birmingham, England); "The Distribution of Foreign Matter In Natural Rubber Supplies," M. G. Peakman (Birmingham, England); "Tensile Strength of Styrene - Butadiene Rubber Vulcanizates — Level and Variation," W. May (Delft, The Netherlands); "Influence of the Thickness of Vulcanizate Samples on the Testing Results of Tensile Strength Measurements according to ASTM Standard Test Method," D. I. Nazeni (Bogor, Indonesia).

Sun Plant on Stream

► Production has started at a new $2 million Sun Oil Co. propylene plant located at the company's refinery at Marcus Hook, Penna. The unit, capable of producing 120 million pounds per year, and said to be the largest in the country, is producing polypropylene-grade material of 99.9 per cent purity from refinery gas streams. The plant has two distillation towers, with a combined total of 140 fractionating trays. The unit produces propylene by fractionation of propane, ethane and butane from catalytic cracking plants and gas stabilization units.

Currently the entire output is going to AviSun Corp., Philadelphia, Penna., joint affiliate of Sun Oil and American Viscose Corp., for manufacture of polypropylene resin, packaging films, fibers and molded products. While the Sun plant was under construction, AviSun — already signed on as a customer—installed equipment at its resin plant in New Castle, Del., for converting propylene to polypropylene film. Film capacity is about 10 million pounds a year. A pilot plant for manufacturing polypropylene continuous filament and staple fibers was also built by AviSun at the New Castle location.

Elect Management Slate

► Shareholders of Industrial Rayon Corp., Cleveland, Ohio, elected management nominees to the company's board of directors in spite of a proxy solicitation by an opposing group which sought to elect five directors. In addition to the election of the slate—by 86.6 per cent of the shares represented at the meeting—a proposal by the opposition group that the company adopt cumulative voting was turned down. Frederick L. Bissinger, president and chief executive officer of the company, told shareholders that operations may be restored to a profitable level during the fourth quarter of the year. He noted that a loss is expected for the second quarter, but that third quarter results should approach the break-even point.

R.I. Summer Outing Attracts 270 Persons

► The 21st Annual Outing and Golf Tournament of the Rhode Island Rubber Club was held on June 9 at the Pawtucket Country Club, Pawtucket, R. I. The affair was attended by 270 members and guests. The prize for first low gross was won by Richard Stimets (Columbian Carbon). Second low gross was taken by William Stone (Kleistone Rubber), and third place went to Lyle Longworth (Monsanto). The Putting Contest was won by William Maguire (Columbian Carbon), with Stanley Szulik (Acushnet) taking second place and Richard Murphy (Pittsburgh Chemical) finishing third.

Other prize winners were: *Nearest to pin on 7th hole,* Richard Stimets (Columbian Carbon); *Nearest to pin on 15th hole,* William Lockline (Industrial Specialties); *Most 6's,* Ralph Allan (Heaveatex); *Most 7's,* Wayne Hockersmith (C. K. Williams); *Most 8's,* Charles Grubb (Witco); *High Gross,* William Glenn (Chemical Products); *High Net,* Rupert Bright (Dow Corning); *Longest Drive,* Connie Lyons (C. T. Lyons Chemical); *Low Net,* Robert Lovezzola (Raw Materials).

Serving on the Outing Committee were: *Golf Tournament,* J. Vitale (Crescent Co.), chairman, and P. Hastings (Kleistone Rubber), assistant chairman; *Putting Contest,* P. Hastings, chairman; *Door Prizes,* J. M. Donahue (Goodyear) and C. A. Damicone (Davol); *Prize Tickets and Dinner Reservations,* E. C. Uhlig (U. S. Rubber), chairman, and W. Blecharczyk (Davol), assistant chairman; *Luncheon Arrangements,* J. Vitale, chairman, and P. Hastings, assistant chairman.

Ups Butyl Production

► Humble Oil & Refining Co., Houston, Tex., has announced that butyl rubber production at its Baytown refinery will be increased from 125 million pounds per year to more than 170 million pounds by the second quarter of 1961. Meanwhile, the first of two projects at the Baton Rouge, La., plant of the company, representing an increase of more than 44 million pounds of butyl per year, has been completed. A further expansion there, scheduled for completion before June 30, 1961, will provide facilities for manufacturing an added 40 million pounds a year.

General Tire Opens Test Track

► General Tire & Rubber Co., Akron, Ohio, has announced the opening of its new 8½-mile test track in Uvalde, Texas, which is reported to be the largest tire testing track in the world. According to the company, the new oval-shaped speedway, will enable the firm to evaluate today's tires and the "tires of tomorrow" more adequately and scientifically than ever before. The dual-lane track was designed by General Tire's Central Engineering Division to road-test automobile tires on an outer banked lane at speeds at high as 200 mph, and truck/bus tires on an inner lane at more moderate speeds.

The company reports that it will be testing tires at the new track in the top speed ranges of today's vehicles, to 125 mph and above. Constant tire checking will give advance warning to the professional test drivers of any pending tire failure. According to the company, in inaugurating a new concept in tire testing, it will center road testing of all highway tires at Uvalde because of ideal climatic conditions and the complete scientific control possible with a private track.

G-E Silicone Names Two

► James E. Hamlin and R. L. Harden have been appointed sales representatives for the Silicone Products Department of General Electric Co. in the East Central and Eastern Districts, respectively. Mr. Hamlin will have his office at 1503 Brookpark Road, Cleveland, Ohio, and Mr. Harden will be located at 1405 Locust St., Philadelphia, Penna. Mr. Hamlin holds a B.Sc. in mechanical engineering from the University of Notre Dame, and a master's degree in business administration from Cornell. He joined G-E in 1954 as a test engineer and has served as a product design engineer and participated in the company's marketing training program. Since October, he has been in training as a sales representative at the Silicone Products Department headquarters in Waterford, N. Y.

Mr. Harden replaces L. J. Sacks, recently appointed Western District Sales Manager. He joined the Silicone Products Department in 1955, serving as materials engineer in the Eastern District for most of his five years with the department.

Stanford Plant Addition

► Stanford Engineering Co., Salem, Ill., has doubled the size of its plant with a new one-story brick addition. Manufacturing facilities have been increased by about 15,000 square feet, and the area of the Engineering and Research Departments has been doubled.

NEMA Unit Realigned

► Vernon W. Heimberger, manager of electrical sales, American Steel and Wire Division, U. S. Steel Corp., Pittsburgh, Penna., has been elected the first chairman of the newly organized Wire and Cable Division of the National Electrical Manufacturers Association, New York, N. Y. The elections took place at a meeting of the board of directors of the Division held in connection with the wire and cable industry's annual convention April 25 to 27 at Westchester Country Club, Rye, N. Y.

At the convention the NEMA Wire and Cable Section was dissolved; separate section status was given to the six subdivisions of the former section; and the new sections were combined with the NEMA Armored Cable Section as a new NEMA Division, the Wire and Cable Division.

Committees Report

Reports were given by chairmen of the major division committees. The Accounting and Financial Committee is nearing completion of a machine accounting code for wire and cable products that will simplify and speed up the reporting of statistics to NEMA. The Industrial Relations Committee has been concentrating its activities on an exchange of information that would enable its members to prepare more effectively for contract negotiations. The Traffic Committee has initiated a proposal for reduced rates on shipments of wire and cable to the West Coast, and the NEMA-IPCEA Committee has resolved several product probdustry.

The Marketing and Statistical Committee has prepared a new product scope for the Division and has made recommendations for changes in Commerce Department reports to provide better information on insulated wire and cable. It has also initiated changes in industry reporting forms. The Packaging Committee has prepared standards on returnable and non-returnable reels, on magnet wire packaging and on shipping pallets. The Tax Committee has provided information to support tax legislation of importance to the wire and cable industry and prepared a recommended formula to assure that state taxation of wire and cable products does not exceed the value of the products in interstate shipping and warehousing.

How Ameripol Rubber puts "English" on the ball

It takes a special rubber material to keep up with the table tennis trade. Those hundreds of tiny rubber nubbins on the paddle enable the player to put plenty of spin or "English" on the ball.

The manufacturer of this material, The Hodgman Rubber Company, turned to Ameripol Rubber to meet his unusual requirements. Since Ameripol 1013 is highly plastic in the processing stage, it proved to have ideal flow characteristics . . . thus a perfect molded pattern and strong bonding to the fabric backing was achieved. And with this light polymer, the material can be made in a variety of gay colors.

When you want to put something extra on the ball, check with Goodrich-Gulf. We produce the broadest range of rubber polymers in the industry, offer thorough technical service to match man-made rubber to your needs. For information contact Goodrich-Gulf Chemicals, Inc., 1717 East Ninth Street, Cleveland 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.
THE ONE TO WATCH FOR NEW DEVELOPMENTS

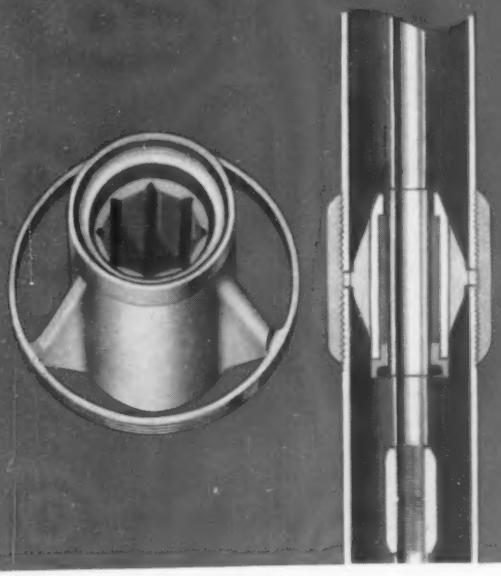
NEWS FROM GOODRICH-GULF

RUBBER BEARINGS KEEP PUMP SHAFT RUNNING SMOOTH

Ameripol Rubber is used for the special Cutless Bearings which support deep-well shafts on several types of pumps for use in wells, tanks, sumps or reservoirs, made by The Deming Company of Salem, Ohio. The bearings are available from Lucian Q. Moffitt, Inc., Engineers and National Distributors, 333 South Main Street, Akron, Ohio.

The Ameripol polymer used is tough, and is not affected by sludges in waste chemicals often found in water. The Cutless Bearing is fluted, thus sand or grit present in the fluid being pumped is quickly washed away. With conventional metal bearings, abrasive solids cut and score the bearing, leading to a loose fit and vibration.

This type of water-lubricated rubber bearing is particularly applicable on industrial equipment where bearings are submerged, as well as propeller shafts of boats.



NEW MARKET FOR RUBBER IN THE COMPACTS

The automotive industry's success in "selling small" has meant a big new market for Styrene-Butadiene Rubber. This compact car, for example, carries approximately 48 pounds of SBR parts.

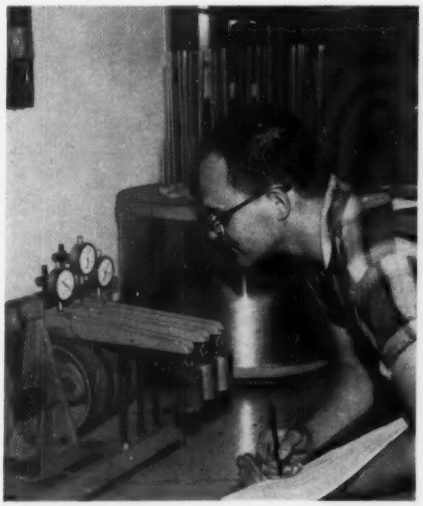
Largest uses by weight are the tires. Other SBR applications include battery, steering linkage and covers, clutch and brake pedals, engine mounts, and a wide assortment of grommets, bushings, and seals throughout the vehicle.

While many parts are SBR, the requirements naturally vary, and many different polymers are used. As the world's largest source of synthetic rubber, with the broadest range of polymers, Goodrich-Gulf is in unique position to help rubber product fabricators supply this new market.

Ameripol
THE PREFERRED RUBBER

RUBBER GETS A "COMPLETE PHYSICAL CHECKUP" AT GOODRICH-GULF SALES SERVICE LABORATORY

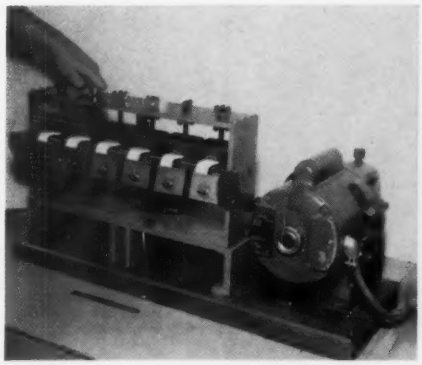
These scenes are representative of dozens of special tests conducted at the G-G Sales Service Laboratory for the benefit of our customers. Here polymers are checked in different compounds to measure the properties needed in individual applications. Problems are thoroughly analyzed so that sound technical recommendations can be made. Evaluations and special tests on polymers you use are available to you through Goodrich-Gulf Technical Service.



Sandpaper rubs rubber raw to check resistance to abrasion.

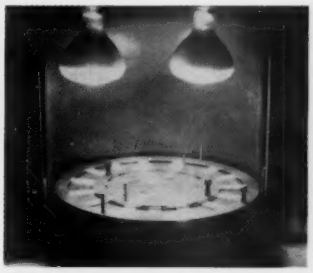
Ease of flow and processing determined by Mooney viscosity test.

Rebound of the swinging hammer gives measure of resilience.



Specimens are flexed hour after hour until failure.

Test strips torn apart to measure strength and elongation.



Effects of sunlight on color evaluated by ultraviolet tests.

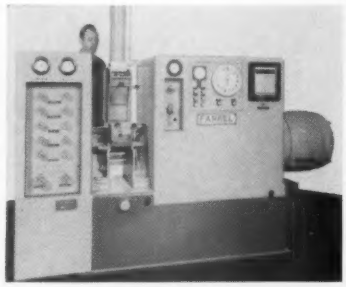
Goodrich-Gulf Chemicals, Inc.

1717 East Ninth Street • Cleveland 14, Ohio

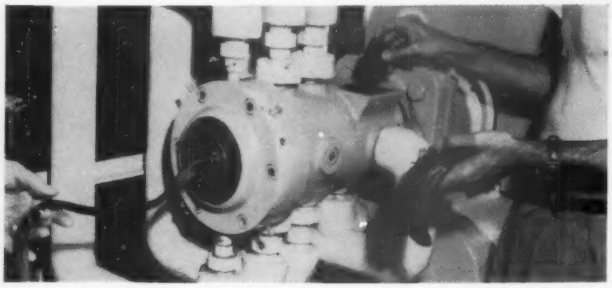
Ameripol
THE PREFERRED RUBBER

PROCESSIBILITY IS A PRIME OBJECTIVE AT GOODRICH-GULF LABORATORY

Easier processing SBR saves you time and money—can often eliminate complete operations in your plant. Thus the Goodrich-Gulf Sales Service Laboratory utilizes processing equipment to help in the development and improvement of these polymers. Ask your Goodrich-Gulf representative for full information on the newer types of low-Mooney Ameripol SBR.



Banbury® Mixer indicates expected results in factory operations.



Variable speed extruder tests smoothness, rate of extrusion, processibility.

This mill is one of several units which help check breakdown characteristics.

Goodrich-Gulf Chemicals, Inc.

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NOW AVAILABLE

A new fully revised and up-dated edition of

RUBBER TO METAL BONDING

by: S. Buchan

M.A., B.Sc. (Aber.), Ph.D. (Cantab), F.R.I.C., A.I.R.I.

1959, 296 pages, with bibliography

$7.50

This new edition of Dr. Buchan's important and comprehensive work, has been completely revised and up-dated to include the many advances and new developments in the technology of bonding rubber-to-metal in the 10 years since the publication, in 1948, of the widely-acclaimed original edition. Describes processes, applications and methods in detail. Gives concise, straight-forward explanations of how to handle rubber-to-metal bonds at each stage of the job. Sufficient materials are included with each description to permit the reader to project given examples to his own needs. Written by the chief chemist of one of the most successful bonding firms in the world, this is the most complete single source of information about a subject of major technical importance to men working in the rubber and adhesive industries.

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Bonding Agents, Polyisocyanates
Bonding Agents, Various
Bonding Vulcanized Rubbers
Testing Bonded Units
The Nature of the Rubber-to-Metal Bond
The Importance of Design

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Hagan pH System

► Hagan Chemicals & Controls, Inc., Pittsburgh, Penna., has designed and manufactured a control system that has been able to maintain the number of pH 6.8 constantly, irrespective of water flow. The company reports that pH 6.8 is the acidity level that tire manufacturers must maintain in the rubber curing process to prevent hairline cracks that might form on tires when exposed to road wear. In the control system, water flow is continuously measured by a Ring Balance Meter, which transmits a pneumatic signal proportionately varying the stroke of acid fuel pump. The pump is calibrated to increase, or decrease, the flow of acid into the main water system with varying flow requirements to the tuber tanks. The pH concentration is sensed, electronically amplified, and sent to a pH recorder. Here the electrical signal is transduced to a pneumatic signal, which is used to adjust the acid feed relay to maintain an accurate pH of 6.8. This precision control of pH is required when the rubber is passed through the huge tuber tanks of water that are part of the tire curing process, the company states, and acid is added to the main water system in just the right amounts to maintain the 6.8 pH concentration.

Cary Promotes Three

► Cary Chemicals, Inc., East Brunswick, N. J., has promoted three men to the posts of treasurer, controller and production control manager. They are, respectively, Albert J. Galuchie, Albert C. Mannella, and Russell W. Buchanan. A graduate of New York University, Mr. Galuchie was formerly with the accounting firm of Peat, Marwick, Mitchell & Co., Newark, N. J. He has been controller at Cary since 1957.

Mr. Mannella, who replaces Mr. Galuchie as controller, is also a graduate of New York University and was also associated with Peat, Marwick, Mitchell & Co. He joined Cary in 1959. Mr. Buchanan studied mechanical engineering at the University of Illinois. He was first employed as a tool and methods engineer at Barber-Colman Co., Rockford, Ill. He has been a sales, promotion, and development engineer at Pullman Standard Car Manufacturing Co., Chicago, Ill., and a management consulting engineer with Wolf Management Engineering Co., Chicago, Ill.

Fisk Boy Revitalized

► U.S. Rubber Co.'s Fisk Boy, who has sparked company promotion for 54 years with the "Time to Retire" slogan, will once again be united with his original "Red Top" tire after years of being shown with modern tires of gradually diminishing size. The smaller and smaller tires depicted threw the sketch of the boy too far out of proportion for an effective illustration. Artist Burr E. Giffen, who created the boy in 1906, is appearing weekends at the company's exhibit in New York's Rockefeller Center to make charcoal sketches of the boy in public.

Rubber by Seaway

► Part of the first cargo of natural rubber to be shipped via the St. Lawrence Seaway, on its way to Akron, Ohio, was unloaded in Cleveland this month. Cleveland port authorities believe crude rubber could develop into the second largest and most valuable import cargo to be landed there, if the shipment proves economically successful. Canadian ore is first. "If we can establish that it is less expensive to route the rubber through Cleveland than the Atlantic seaboard, the future volume should be of great value to all of us," William J. Rogers, Cleveland port director, said. Originally, two Cleveland stevedoring companies submitted bids for unloading the rubber, which the shipping company considered too high. The National Terminals Corp. of Cleveland contracted to unload 1,300 tons of rubber from the vessel, the Hartismere. The Hartismere also has rubber abroad consigned for Toronto, Hamilton, Detroit, and Chicago.

SP Rubber Tests Compiled

► A report on SP rubber, compiled by the Foundation of Natural Rubber Research and Development, Tokyo, Japan, coincides with a steady rise in the usage of the rubber, as it approaches the 3,000-ton per year consumption mark. The report, based on tests conducted by ten Japanese rubber manufacturers under the supervision of the 36th Sub-Committee (New Rubbers) of the Rubber Engineers' Association of Japan, points up the unique extruding and calendering qualities of SP rubber. The conclusions drawn from the tests are summarized in three categories: tests in which SP rubbers are superior to normal rubber; tests showing little difference between SP and normal rubber; and tests showing SP rubber at a disadvantage. *Rubber Developments*, (published by the Natural Rubber Bureau) in a current article on the tests notes that by judicious compounding all the disadvantages listed can be overcome without sacrificing any of the advantages. A free copy of the issue of *Rubber Developments* reporting on the Japanese tests may be obtained from the Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D.C.

Hercules Names Four

► Hercules Powder Co., Wilmington, Del., has announced four new appointments. E. F. Jennings, Jr., has been named plant manager of the company's new multimillion dollar polypropylene plant which is under construction at Lake Charles, La. J. G. Copeland, Jr., has been appointed plant manager of the company's plant at Parlin, N. J. F. N. Bent has been named assistant plant manager at Parlin, and R. J. Bechtel, technical assistant to the director of operations at the home office.

Mr. Jennings, with Hercules since 1939, has been at the Parlin plant during his entire association with the company. He had been plant manager at Parlin since 1954. Mr. Copeland, new manager of the Parlin plant, had been assistant plant manager there since 1956. He has been with Hercules since 1936, and was formerly at the company's Research Center near Wilmington, Del. Mr. Bent, who succeeds Mr. Copeland as assistant manager, was formerly technical assistant to the director of operations in the Cellulose Products Department.

MODERN FOR YEARS TO COME

ANOTHER COMPLETELY NEW, GAS-FIRED RUBBER DRYER by SARGENT

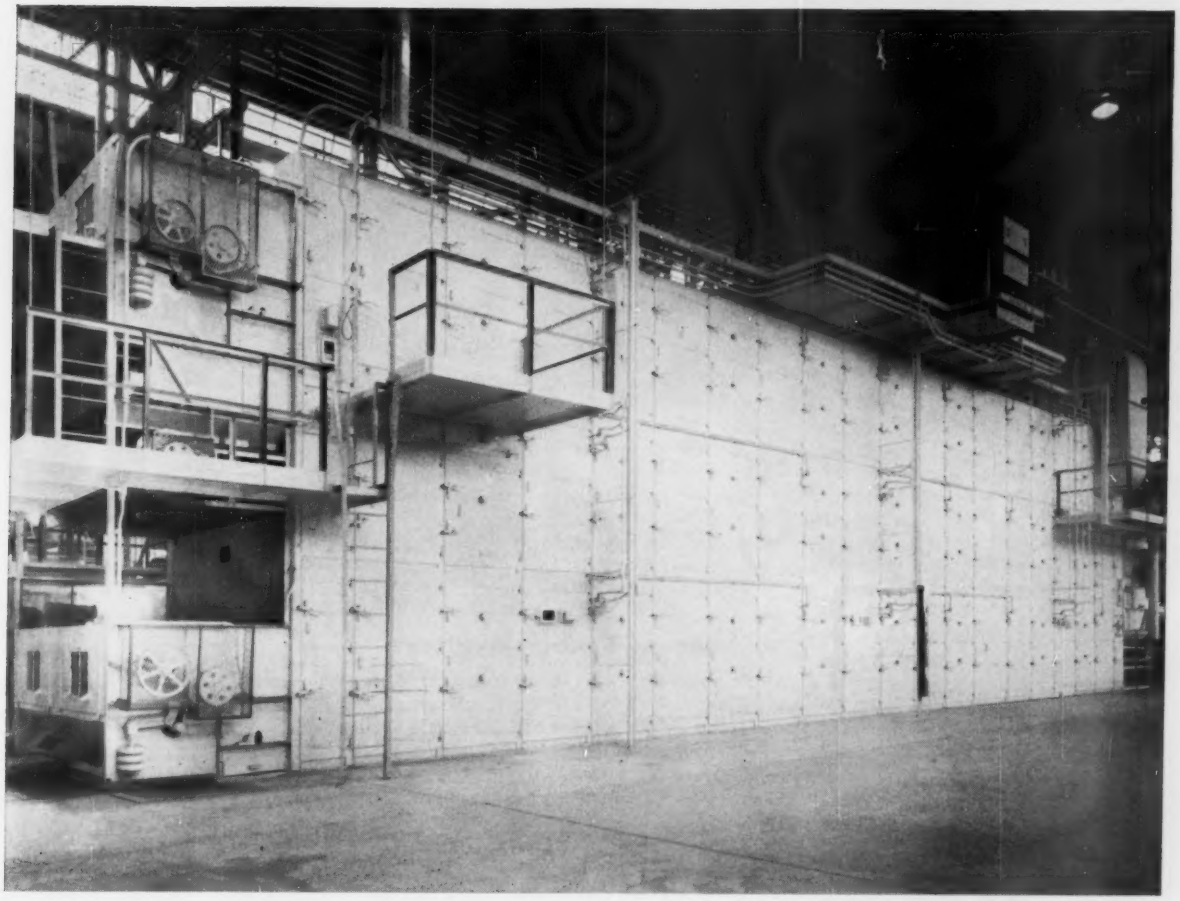

PHOTO COURTESY POLYMER CORPORATION LIMITED, SARNIA, CANADA

POLYMER CORPORATION LIMITED, of Canada, world leaders in development of new applications and new compounding techniques for synthetic rubbers, selected SARGENT to design and build this high volume dryer for their modern new plant at Sarnia. It is believed to be the world's largest gas-fired synthetic rubber dryer . . . and was erected in a record-breaking four weeks.

A direct gas-fired, 3-pass machine, equipped with SARGENT-designed perforated special type stainless steel flight conveyors, it has SARGENT'S exclusive-design breakers, cleaners, and traveling silicone spray devices to provide a perfectly clear conveyor at all times. Dusting and fines are practically eliminated. Downtime for cleanout between runs has been drastically reduced and is kept at a minimum because of SARGENT'S unique housing design. This allows free access to the entire dryer interior through full height hinged doors and quickly and easily removed full height panels which cover the framework.

One of many unusual features of this dryer is that even though the heat source is supplied by only two gas burners, working temperature in the dryer is reached in less than ten minutes from start-up.

Another example of SARGENT modern design and advanced engineering in building dryers to meet varying requirements.

C. G. SARGENT'S SONS CORPORATION

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J. H. Day Changes

► J. H. Day Co., Division of the Cleveland Automatic Machine Co., Cincinnati, Ohio, has announced changes in administrative duties and titles to facilitate the company's policy of expanded service to customers and the development of new and advanced processing techniques and equipment. Ray D. Allison, formerly chief engineer, has been elected vice-president of Cleveland Automatic Machine and has been made general manager of the Day Division with supervision over all operating departments, engineering, sales, research and development.

Robert A. Miller, previously sales manager in charge of bakery equipment sales has been appointed sales manager of the entire Day Division, directing sales to the chemical processing and other industries as well as to the bakery field. Jack L. Diltz, manager of industrial sales, Day Division, will, in his newly created position of product and market research engineer, devote full time to the study of customer processing requirements. Martin Miller, a vice-president of Cleveland Automatic Machine, will assume staff duties which will include over-all planning for the Day Division.

Butyl Used in Foundation

► A new 44-story building for the Humble Oil & Refining Co., Houston, Tex., is being constructed on a black carpet of butyl rubber. The butyl sheeting will serve as a water barrier for the foundation of the building, scheduled for completion in 1962. The sheeting is lowered to the bottom of the Humble building excavation, where workers unroll it like a carpet on a thin concrete slab. A seven foot thick steel-reinforced concrete slab will be laid on the butyl cushion. The sides of this foundation and the retaining walls above will also be encased by the membrane.

Continental Expands

► Hatfield Wire & Cable Division of Continental Copper and Steel Industries, Inc., Linden, N. J., recently acquired a plant at Linden for the exclusive production of rubber insulated wire and cable. In addition, the company is installing a new copper rod rolling mill at this facility. Both installations are part of Continental Copper's $10 million expansion and modernization program.

RRI Develops PA-80 Mix

► The Rubber Research Institute of Malaya, which developed Superior Processing Rubber (SP), has perfected Processing Aid 80 (PA-80) which is said to give rubber with which it is mixed all the calendering and extruding advantages of SP. According to RRI, since PA-80 is fully compatible with butadiene-styrene, these advantages can be extended to blends of natural and butadiene-styrene rubbers. PA-80 is said to improve processing of butadiene-styrene stocks far beyond any point obtainable with similar amounts of natural rubber.

PA-80 is reported to be a flexible compounding agent that may be used in open mills or internal mixers, and the principles of compounding are generally similar to those applicable to the regular SP grades. The mixer is fully described in an issue of "Rubber Development," which can be obtained from the Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D.C.

Malayan Rubber Meeting

► The Rubber Research Institute of Malaya will sponsor the first International Conference on Natural Rubber Research since World War II at Kuala Lumpur, Malaya, Sept. 26 to Oct. 1. The conference will be supported by the government of the Federation of Malaya and the Rubber Producer's Council. It will follow a shipper's and packer's conference to be held during the first week in September, and the 15th conference of the International Rubber Study Group, which will begin Sept. 12. For further information on the natural rubber conference, write to the National Rubber Bureau, 1631 K St., N. W., Washington 6, D. C.

"You haven't seen a 10,000 ton a year butadiene plant lying around, have you?"

RD Plans Meeting

► The Rubber Division of the American Chemical Society will hold its Fall Meeting on September 14 to 16, 1960, at the Hotel Commodore in New York City. In addition to the scheduled four sessions for general or contributed papers, there will be two special lectures. Dr. C. S. Marvel (University of Illinois) will present a lecture on "Recent Developments in High Temperature Rubbers," and Prof. Maurice Morton (University of Akron) will lecture on "Recent Developments in Anionic Polymerization." The first technical session is scheduled to begin at 2 p.m. on Wednesday, September 14. Full program details and abstracts of all technical papers are given on pages 648-654 of this issue.

Armstrong Stock Vote

► Shareholders of the Armstrong Rubber Co., West Haven, Conn., approved the conversion of the Class A non-voting and Class B voting stock into a single class of common stock with full voting rights at a special meeting. The new voting common stock has been listed on the New York Stock Exchange. At the same time, shareholders gave approval to the board's proposal to achieve 100 per cent ownership of the company's affiliate, Armstrong Tire and Rubber Co., by acquiring the 50 per cent interest held by Sears, Roebuck and Co.

SRG Elects Officers

► The Southern Rubber Group elected and installed its officers for 1960-1961 during its Spring Meeting on June 10 at the Dinkler-Tutwiler Hotel in Birmingham, Ala. The new officers are: *Chairman*, Lenoir Black (C. P. Hall); *Vice-Chairman*, Roswell C. Whitmore (Better Monkey Grip); *Secretary*, R. W. Rice (Firestone); *Directors*, D. A. Reneau (United Carbon) and C. P. McKenna (Vector Mfg.).

Spalding Offers Shares

► A. G. Spalding & Bros., Inc., New York, N. Y., offered 85,484 shares of common stock for subscription by stockholders at $20 a share, in the ratio of one new share for each 10 shares held, up to June 24. The stock proceeds will cover 85 per cent of the indebtedness incurred recently by the company in purchasing A. G. Spalding & Bros., Ltd., a former subsidiary.

BUSY BELT—Union Lumber Company of Fort Bragg, California, operates one of the three largest redwood lumber mills on the Pacific Coast. They specialize in redwood lumber and veneers, as well as numerous by-products. Virtually nothing is wasted. The redwood bark is used to make fiber packing pads and the redwood chips are sold for the production of fiberboard. It is essential that the mill operate almost continuously. To promote smoother running and help prevent emergency shut-downs, Union Lumber had installed this 2,000 foot conveyor belt to carry sawdust and scrap away from the various machines. The belt, made by the Boston Woven Hose & Rubber Division of the American Biltrite Rubber Company, has been in operation for five years – and is expected to serve an additional ten years. The sturdy, wear-resistant carcass of the belt was fabricated from one of Mount Vernon Mills' synthetic fabrics.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

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Stauffer and American Synthetic Team Up To Build New Rubber Plant in Louisville

► Polybutadiene and polyisoprene synthetic rubbers will be manufactured by American Rubber and Chemical Co., just formed as a joint venture by the Stauffer Chemical Co. and the American Synthetic Rubber Co. The new company has obtained a license from Phillips Petroleum Co. for processes to produce various grades of synthetic rubbers.

The firm is building a multi-million dollar plant at Louisville, Ky., with completion scheduled for September, 1961. It will be located adjacent to the present American Synthetic Rubber plant. According to the company, the Louisville site was selected because of its proximity to this facility, major rubber consumers and suppliers of raw materials.

50,000 Long Tons Foreseen

Initial capacity of the new plant will be 30,000 long tons of polybutadiene and polyisoprene rubbers annually. The new plant will be so designed that, with minor modifications, output is projected to reach 50,000 long tons per year.

Hans Stauffer, president of Stauffer Chemical, has been named board chairman of the joint company; its president will be Grant Thomas, also president of American Synthetic Rubber. In commenting on the new venture, the executives announced: "The joint enterprise pools the resources of our two companies and provides a unique opportunity for the integration of our complementary experience.

"We anticipate that American Rubber and Chemical will become a major factor in the production of polybutadiene and polyisoprene rubbers and in the development of other economically attractive elastomers."

The parent companies each own 50 per cent of the new corporation's stock. The engineering department of Stauffer Chemical will be responsible for constructing the new plant, while American Synthetic Rubber will manage commercial production and marketing. Both firms will staff the pilot plant and research laboratories, that are to be a part of the Louisville project.

Officers of the new company, in addition to Mr. Stauffer and Mr. Thomas, are: Archie Albright, vice-president; Carleton S. Connor, secretary, and Tolman G. Everett, treasurer. The board of directors includes: Hans Stauffer, Grant Thomas, Archie Albright, James Kettle, David Bernstein and Everett Morss.

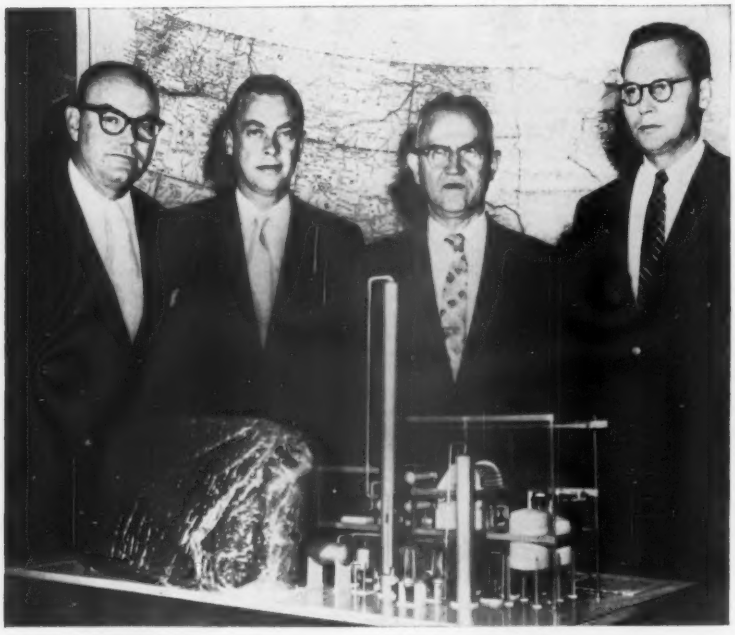
Products of Novel Import

Polybutadiene synthetic rubbers have only recently attracted commercial interest and are, as yet, made only in limited quantities in the United States. However, American Rubber and Chemical reports that these novel compounds have a number of characteristics which are superior to those of natural rubber.

In particular, polybutadiene compounds have unusually good resistance to abrasion and heat. Consequently, they are potentially suited for use in truck tires, wire and cable insulation, belting and mechanical rubber goods.

Truck tires, in which polybutadiene rubber replaces 50 per cent of the natural rubber, are said to be superior to all-natural tires in both abrasion resistance and heat build-up. Because these qualities are of prime importance for truck tires, the company believes that the new synthetic will serve a two-fold purpose: releasing much of the natural rubber now used in truck tires, and imparting better wearing qualities to them.

According to American Rubber and Chemical, passenger tire tests, using SBR-1500 tires as a control, established the superior abrasion resistance of 90 per cent polybutadiene and 10 per cent natural rubber formulations by 25 per cent over conventional 1500 tires. Polybutadiene rubber promises to be an economical alternate or supplement for natural rubber in many other fields of application, as well. There is furthermore, little prospect that production rates of the natural product can be increased rapidly enough to cope with anticipated world demand. Of equal importance is the fact that rubber made from butadiene is derived from a raw material which is abundantly available in uniform quality from domestic sources.



MODEL OF PROPOSED SYNTHETIC PLANT building is inspected by new firm's executives (L to R): C. S. Connor, G. Thomas, H. Stauffer and A. Albright.

Firestone Round Tire

► Firestone Tire & Rubber Co., Akron, Ohio, has constructed a rounded tire which is made by a new method of tire molding, developed and introduced by the company. In current manufacture, tires are made in two-piece molds that part in the center of the tread. Using a new type mold, the tread will be molded in a single unit, producing an unbroken ring of tread design that is said to result in virtually round tires. The new tire, to be known as the True Tread, is expected to give a "smoother, more vibration-free ride." According to the company, the mold allows complete freedom of tread design extending across the face of the tread. The center area of the tread can now be tractionized to give the consumer a safer, sure-footed tire, providing improved grip on wet surfaces and on snow and ice. This is called the total traction principle.

The first tire to be built on this new mold will be the Firestone Nylon 500, a premium tire made with X-101 tread rubber. Its advantages are improved traction for all driving conditions; tread wear improved up to 35 per cent, smoother operation, more comfortable ride, better durability at high turnpike speeds, and increased stability for easier handling of car, the company states. This tire will be available to the consumer in all 13, 14 and 15-inch rim sizes.

Union Asks Pay Rise

► The United Rubber Workers Union has initiated a drive to win wage increases for 100,000 rubber workers by filing a wage reopener notice with Firestone Tire & Rubber Co., Akron, Ohio. According to the union, reopener clauses with other major companies will subsequently be invoked. No specific wage demand will be made by the union in the negotiations.

The contract provides that negotiations on wages are to start within 30 days after the reopener notice is served. If an agreement has not been reached within 60 days after notice, the contract may be cancelled and the union is legally free to call a strike. The union conducted lengthy strikes last year against Firestone, B. F. Goodrich, and U. S. Rubber, but wages were not an issue at that time.

Sinclair and Koppers Build

► Sinclair Oil Corp. and Koppers Co., Inc., have jointly announced plans to build a new petrochemical plant at Houston, Texas, to produce 70 million pounds of styrene monomer annually. According to the announcement, a new jointly-owned corporation will be formed to own and operate the plant, with completion and initial operation of the unit expected by the middle of 1961. Sinclair Refining Co., an operating subsidiary of Sinclair Oil Corp., will supply the raw material for the new company, and Koppers will use or market the styrene output of the plant.

Carwin Building Plant

► Carwin Co., North Haven, Conn., is building a new plant at LaPorte, Texas, that will more than double its existing capacity for isocyanates. The new facility is expected to be completed in the latter half of 1960. Its chemicals will be used as raw materials for rubber, plastics, adhesives, coatings, drugs, and waterproof treatments for wood, cloth and paper, the company states.

This NEW 3" x 8" THROPP MILL
expedites
rubber and plastics research

Aided by many years of experience in designing laboratory mills, Thropp engineers have developed this up-to-date 3" x 8" model. It sets new standards for attractive modern design, compactness and economical maintenance.

The new mill, designed for processing small batches, is one of the Thropp family of rubber and plastics mills, ranging in size up to 84". The machine has tilting type guides to facilitate thorough and rapid cleaning and prevent carry-over of color or other contamination to subsequent batches.

Manufacturers who appreciate the importance of fast, accurate, economical research and development work will find this machine a sound investment. Send for further information.

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Addresses ACS Meeting

► How rubber chemicals can be identified by color was discussed by Clifford L. Hilton (U. S. Rubber) in a paper presented before the Analytical Division of the New York Section of the American Chemical Society at its meeting-in-miniature on March 11. The research scientist told the meeting how protective substances such as antiozonants in rubber are identified as to type and amount by the depth of the characteristic colors that develop when the substances are treated with special chemicals. Speaking on the subject, "The Determination of Flexzone 3-C and Other p-Phenylenediamine Derivatives," Mr. Hilton explained that certain antiozonants like Flexzone 3-C can be converted to colored compounds using a special oxidizing agent. The intensity of the colors of these colored compounds indicates their concentration and the color itself identifies the particular antiozonant. According to Mr. Hilton, the procedure works for many of the commercial p-phenylenediamine type of antiozonants.

Institute Group Widened

► New members have been appointed to the Executive Committee of the Scrap Rubber & Plastics Institute, a division of the National Association of Waste Material Dealers, Inc., New York, N. Y., in order to give it wider national representation with a view to broadening the Institute's programs. They are: Harry Alpert (J. Solotken), Hy Helbein (Southern Metals), Milton Kuskin (A. Schulman), Sherrard Nott (Frank H. Nott), Charles E. Rasher (McMahon Iron), Henry M. Rose (H. Muehlstein), Joseph M. Viener (Hyman Viener), and Sol Walker (Sol Walker).

To Carry Car Products

► Product lines of United Motors Service, division of General Motors, will be added to the Firestone TBA line, according to an announcement made by Earl B. Hathaway, vice-president, sales, Firestone Tire & Rubber Co., Akron, Ohio. The move is described as part of a trend toward recognizing service stations as one-stop facilities for all car service needs. In addition to Delco batteries added to the Firestone TBA line last spring, the complete line of United Motors Service products will provide virtually complete coverage for passenger cars and light trucks.

John Stroh, left, police lieutenant and master sergeant in the U. S. Army Reserve, and J. L. Cohill, right, Firestone vice-president, examine re-sealed bullet holes in a Rolling Fluid Transporter tire filled with gasoline. In test procedure, a few seconds after bullets were fired into the tire the holes were closed by expansion of the neoprene rubber tread.

Fuel-Filled Tire Tested

► A Rolling Fluid Transporter tire with a capacity of 521 gallons of fluid, designed to transport gasoline within the body of the tire, is being tested by the Firestone Tire & Rubber Co., Akron, Ohio. The transporter carriage consists of an axle and tow bar assembly. Two of the giant tires, each more than five feet tall and three and a half feet wide, are mounted on the axle and hitched by a tow bar to the back of a truck. One truck can pull a train of five of these "fuel trailers" or more than five thousand gallons of fuel. Firestone developed an automatic tire building drum and utilized completely new tire building techniques in manufacturing the Transporter.

Named by Harchem

► M. F. Antonovich has been appointed to the post of general purchasing agent for the Harchem Division of Wallace & Tiernan, Inc., Belleville, N.J. The appointment is in line with consolidation of all purchases of fats, oils and other chemical raw materials and supplies for the division. Mr. Antonovich, who joined the company in 1957, has been sales manager of the Chemical Department since 1958. Previously he was associated with Advance Solvents & Chemicals, Inc., New Brunswick, N.J., for 27 years concurrently holding such posts as sales promotion and advertising manager, sales manager of the Vinyl Stabilizer Division, vice-president and director of the Canadian affiliate.

Polyisoprene Capacity Up

► Shell Chemical, Los Angeles, Calif., has announced that it will triple its projected plant capacity for the production of polyisoprene. Shell Isoprene Rubber, the company's name for the new synthetic, has been manufactured commercially on a scale of up to five tons per day at Torrance, Calif., for slightly over a year. The Torrance plant is now being expanded to a capacity of 40 million pounds per year with completion of construction due this fall. The second installation, now in an advanced stage of engineering design, will be on stream one year later. The expansion will involve construction of an integrated monomer-polymer plant of 80 million pounds annual capacity at a midwestern location. The hydrocarbon feedstocks for the plant will come from Shell's Wood River Refinery near St. Louis, Mo.

Joins Harchem Chemical

► Edmond V. Tyne has been named sales manager by Harchem's Chemical Department of Wallace & Tiernan Inc., Belleville, N. J., succeeding M. F. Antonovich, who has been appointed head of Harchem's Purchasing Department. Mr. Tyne has 22 years of marketing experience. He was formerly associated with Minnesota Mining and Manufacturing Co., and holds a degree in Chemical Engineering from the Newark College of Engineering. Products of the Harchem Division include sebacic acid, specialty plasticizers, specialty chemical intermedaite, diester fluids for synthetic lubricants, and a broad line of fatty acids and their esters.

Singer Acquires Fidelity

► The Singer Manufacturing Co., New York, N.Y., has agreed to purchase Fidelity Machine Co., Inc., Philadelphia, Penna., at an undisclosed price. Among Fidelity's products is machinery for reinforcing plastic, rubber and metal hose and covering wire. Its sales rate tops $8 million annually. Singer is a producer and distributor of sewing machines and electrical equipment.

Wyrough and Loser Moves

► Wyrough and Loser, Trenton, N. J., has moved its main offices to larger quarters at 2 Brunswick Circle Extension, Trenton, N. J. The firm's former location was at Broad Street Bank Building in Trenton.

O-M Expands Facilities

► Industrial Chemicals Division of the Olin Mathieson Chemical Corp., Baltimore, Md., has begun an expansion program, costing between $38 and 40 million, to strengthen and broaden the company's position in chemicals used in industrial production. Many of these chemicals will have applications in the rubber industry. At Brandenburg, Ky., facilities for the production of propylene oxide, propylene glycol and polypropylene glycols are close to completion. Construction is also under way on facilities for the production of glycerin and epichlorohydrin. Already completed are facilities which double production of glycol ethers, surfactants, and ethylene dichloride.

At Joliet, Ill., a plant to produce sulfamic acid, is under construction, with completion scheduled later this year. The division is also improving its chlorine production facilities at Niagara Falls, N. Y. A new company, jointly owned with Sun Oil Co., SunOlin Chemical Co., is constructing an $8 million plant for production of synthetic urea from ammonia, at Marcus Hook, Penna. SunOlin also plans to construct at North Claymont, Del., a new $15 million plant to produce ethylene. Another new company, Penn-Olin, jointly owned with Pennsalt, is planning construction of a $6.5 million plant at Calvert City, Ky., for production of chlorate compounds.

Named Sales Manager

► Russell O. Newton has joined the Erie Foundry Co., Erie, Penna., as sales manager, in which post he will be responsible for the sales administration of all Erie products. Mr. Newton was formerly district sales manager for industrial products in the New England area for Brown and Sharpe Manufacturing Co. During his eleven years with Brown and Sharpe, he was also representative for machine tools in Pittsburgh, Penna., and Chicago, Ill.

Tingley Consolidates

► All manufacturing operations of Tingley Rubber Corp., Rahway, N.J., will be consolidated under one roof upon the completion of a new plant in South Plainfield, N. J. The decision to build the plant was based on increased sales of the company's waterproof footwear. The building will be a modern, one-story structure of about 120,000 square feet.

Polyurethane Fills Missile

► The inside of a Polaris missile is filled with polyurethane, instead of the thousands of tricky pipes, tubes and valves that fill the insides of a liquid-fuel rocket like the Atlas or Titan. In the middle of the rubber is a star-shaped wick, which is the fuel. According to Rear Admiral W. F. Raborn, a Polaris missile packed with the polymer, with a solid fuel wick, will stand ready for instant firing for a long time—as long as the submarine, bearing it, can go between overhauls.

Chemical Merger Due

► A merger of Minerals & Chemicals Corp. of America, Menlo Park, N. J., and Philipp Brothers, Inc., an import-export concern, has been proposed by both boards of directors. The new corporation would be known as Minerals & Chemicals-Philipp Brothers, Inc. Minerals & Chemicals produces mainly kaolin, used as a paper filler and coating; kaospheres, which are petroleum cracking catalysts; and attapulgite, a magnesium-aluminum silicate absorbent material. For the merger to be accomplished, shareholders of Minerals & Chemicals would have to vote on a proposal to increase the authorized shares to at least 5,200,000 from its present 2,200,000. Combined net worth of the new corporation would be about $52 million, with pro forma working capital in excess of $36 million.

Goodrich Appoints Hart

► John N. Hart, controller of the B. F. Goodrich Co., Akron, Ohio, since 1957, has been elected a vice-president of the company and will continue in the post of controller. Mr. Hart was graduated from Ohio State University in 1931, did graduate work there, and was a member of the faculty, at the same time functioning as director of research for the Ohio Department of Taxation. He joined Goodrich in 1945 as an economist in the Business Research Department. Next he served as director of personnel at Akron, and in 1953 he was named corporate director of employee relations. In 1957 he was elected controller.

Dayco Division Formed

► Dayton Dayflex Plastics Co. has been formed as a division of the Dayco Corp. (formerly Dayton Rubber Co.), Dayton, Ohio, to control manufacturing and sales operations of the company's line of plastic vacuum cleaner, hair dryer, swimming pool, vent and exhaust hose. It absorbs the operations of the former Dayflex Plastics Division of Dayton Rubber and will also develop, test and manufacture other highly specialized plastic products. Headquarters of the firm will be in Dayton. S. K. Lamden, named general manager, will have full responsibility for the coordination of sales and manufacturing functions as well as product development in the division. He joined the corporation as manager of special product development in 1947 and was named sales manager of the Dayflex division when it was formed in 1954.

Six Fill New Positions

► The board of directors of the Electric Storage Battery Co., Philadelphia, Penna., has created six new offices and elected six executives to fill the posts. They are: *vice-president, finance*, D. N. Smith; *vice-president, Industrial Division*, M. G. Smith; *vice-president, research*, C. G. Grimes; *vice-president, employee relations*, J. S. Hudson; *vice-president, Automotive Division*, F. J. Port; and *assistant treasurer*, H. J. Ulkloss, Jr. Mr. D. N. Smith and Mr. M. G. Smith were formerly vice-presidents. Mr. Grimes was director of research; Mr. Hudson, director of industrial and public relations; and Mr. Port, general manager of the Automotive Division.

Pennsylvania Truck Tire

► The Super Hi-Tred Lug nylon truck tire, manufactured by Pennsylvania Tire Co., Mansfield, Ohio, is designed for stop-and-go and over-the-road hauling service. According to the company, the premium quality truck tire is cool running and ideal for the high speed, heavy load traction required of drive wheels. It has a 75 per cent deeper non-skid surface and will deliver proportionately greater mileage. The tire is heavily reinforced and has a wider, flatter tread design which permits retread after retread. The tread does not retain mud, stones or snow, and the tire's reinforced shoulders and sidewalls resist cutting and scuffing, it is said.

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Discusses Flexing

► Dr. Edward M. Bevilacqua, senior research scientist at the Rubber Center of the U. S. Rubber Co., Wayne, N. J., said at a recent seminar held at the Polytechnic Institute of Brooklyn that scientists are constantly searching for new ways to protect rubber and plastics goods against the forces of nature. He cited the effect of repeated flexing on rubber as one of these unsolved problems. The antioxidants now in use are not the complete answer to deterioration due to flexing, and this presents a continuing challenge to the rubber plastics scientists, he said. He added that the method of mixture of raw materials can also affect the properties of rubber goods, using as an example the sensitivity of extruded parts to the mixing temperature. Dr. Bevilacqua also discussed ways in which small fragments broken off from rubber molecules during reaction in air can be detected, and what can be learned from their chemical make-up.

Goodyear Belt Test Unit

► Development of a testing unit that is said to submit conveyor belting to tensions far greater than any other testing facility in the industry has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. The $250,000 high-tension belt-life tester, designed by the company's Development Department, will simulate conveyor operation at speeds up to 2,000 feet a minute and impose stresses as high as 250 000 pounds on belting samples as long as 60 feet and as wide as 60 inches, according to the company. The unit will also enable Goodyear engineers to test frictional characteristics of belt conveyors, strains and distribution of tensions in twisted conveyors, and joints and splices in highly stressed belts.

AviSun Plans Expansion

► AviSun Corp., Philadelphia, Penna., has awarded a contract for a 100 million pound-per-year polypropylene plant, to be built in the East, to Bechtel Corp. of San Francisco, Calif. AviSun, created in 1959 as a joint venture of American Viscose Corp. and Sun Oil Co., is also expanding its production facilities at Port Reading, N. J., to a 25 million pounds-per-year capacity. The company has an option to purchase additional facilities so that AviSun could expand its polypropylene resin production to 150 million pounds, according to Chalmer G. Kirkbride, president.

Blimps Carrying Rockets

► Scientists at Goodyear Aircraft Corp., Akron, Ohio, report that only blimps can meet the problem of transporting rocket boosters from factory to launching pad, especially as plans call for larger and larger components in missile development. R. W. Richardson, Goodyear Aircraft vice-president, observes that some of the boosters now being hauled by tractor-trailer over major highways are only ten feet wide, yet the special trailers involved straddle nearly two lanes of roadway. Rocket booster stages 22 feet in diameter, 75 feet long and weighing 40 tons are being developed, he states, and larger ones are contemplated. No presently operating system can transport these. Mr. Richardson pointed to a recent Goodyear study that stresses such blimp advantages as: airships operate in the freedom of the skies, independent of tunnels, trestles, waterways and highway clearances; they fly into and from fields too small for transport airplanes, and can make point-to-point deliveries; their smooth, effortless operation eliminates possibilities of damage to sensitive components; and they can operate over extended distances.

ADM Plans Chemical Unit

► Archer-Daniels-Midland Co., Minneapolis, Minn., has announced that it will build a multi-million dollar chemical center on a 200-acre site near Peoria, Ill. Ground will be broken in late Summer or early Fall, with plant operations scheduled to begin in the Spring of 1962. The Peoria chemical center is designed to provide a basis for future expansion in chemicals. When it is completed, ADM will have facilities for increased production of such chemical intermediates as nitrogen chemicals, plasticizers and esters.

Girton Joins Dayco

► Robert L. Girton has been named factory manager of Dayton Tire & Rubber Co., division of the Dayco Corp., Dayton, Ohio, succeeding O. H. Stork who retired as factory manager at Dayton after 36 years with the company. In his new post, Mr. Girton will have full responsibility for all phases of tire production from raw materials procurement to final inspection. He holds a B.S. degree in business administration from Temple University, and was formerly a production manager for a major rubber company in Akron, Ohio.

Goodrich Names Conner

► David S. Conner has been named sales representative for Hycar special purpose rubber at B. F. Goodrich Chemical Co., Cleveland, Ohio, and will serve Rhode Island, southeastern Massachusetts and eastern Connecticut. His headquarters will be in Boston. He had been a product engineer in the Hycar Technical Service Department at the company's main office in Cleveland, Ohio, since October of last year.

He was graduated from Arkansas State College in 1949 with a B.S. degree in chemistry, and received an M.S. degree in analytical chemistry from Purdue in 1955. He joined Goodrich Chemical in 1955, working in analytical methods development for textile fibers, and was then transferred to process development work in connection with a synthetic-natural rubber project. In 1957 Mr. Conner was placed in charge of the chemical testing laboratory servicing the Hycar polymer development group at Goodrich Chemical's Development Center in Avon Lake, Ohio, and in 1959, he was transferred to the Hycar technical service group at the Development Center.

Elected by U.S. Rubber

► Granville T. Pownall has been elected secretary of U. S. Rubber Co., New York, N. Y., succeeding William M. Dougherty who has retired after 37 years with the company. Mr. Pownall was graduated from the University of Cincinnati and studied at the Harvard Graduate School of Business Administration. He joined U. S. Rubber in 1942, working in the Purchasing Department of the ordnance plant in Marion, Ohio, which the company operated for the Government during World War II. He transferred to the company's New York headquarters as assistant in the secretary's office in 1943 and was appointed assistant secretary of the company in 1949, a post which he held until his election as secretary.

Enjay Becomes Division

► Enjay Co., Inc., New York, N.Y., has become the Enjay Chemical Co., a division of Humble Oil & Refining Co., Houston, Texas. The petrochemicals firm has assumed responsibility for the marketing and coordination of the Humble Company's chemical products activities in the United States. Enjay will also sell chemicals to Esso Export Corp. for distribution in foreign markets. J. E. Wood, III, will continue as president of Enjay.

Manager for U.S. Rubber

► Henry W. Willard has been named production manager of the Mechanical Goods Division of U.S. Rubber Co., New York, N. Y. Mr. Willard, operating out of the firm's New York City headquarters, will supervise plant production and product development at Philadelphia, Penna., Passaic, N. J., and Sandy Hook, Conn. A graduate of Cornell University, he joined U.S. Rubber upon graduation in 1934 as a time clerk at the Passaic plant. By 1942, when he left the plant for a tour of military service, he had risen to a managerial post in the Industrial Engineering Department. Upon his return in 1946, Mr. Willard was named assistant general superintendent, then assistant division superintendent later that year. He became division superintendent in 1949, general superintendent in 1950, and assistant factory manager in 1952. That same year he was named factory manager of the Passaic plant.

Oerlikon Buys Control

► A Swiss group led by Oerlikon-Buehrle has acquired a controlling interest in Rubber Corp. of America, Hicksville, N. Y. Oerlikon is a manufacturer of machine tools. Dynamit AG of Troisdorf, Germany, an Oerlikon affiliate, is expected to make technical information available to the rubber concern. Merton Trading Co., newly-formed organization, will handle import and export business formerly conducted by Rubber Corporation, and Richard G. Merton will head the new concern.

Rubber-Asphalt Highway

► A red natural rubber and asphalt superhighway has been opened in Birmingham, England. The red color of the road comes from a 1¼-inch thick wearing course of red rubberized asphalt mixture dressed with ½-inch red pre-coated chippings. Underneath is a 2¾-inch base, also containing rubberized asphalt, laid on a concrete foundation. The project was based on the opinion that rubber-and-asphalt surfaces provide long wear and less maintenance.

New Anderson Agent

► Ware Chemical Corp., Westport, Conn., has named Wayne F. Anderson of Anderson and Co., Akron, Ohio, as Akron area agent for Ware's line of pre-dispersed chemicals sold under the trade name Prespersions.

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New Dayco Consultant

► Richard G. Hayes has been named to the newly created post of technical consultant on urethanes at the Dayco Corp., Dayton, Ohio. He will have his headquarters in Dayton and will be primarily associated with the Dayton Industrial Products Co. Division of the company, also acting as liaison and coordinator for urethane development and product application programs with other divisions of the corporation. He will develop special formulations and provide customer assistance for the sales departments handling urethanes and will be responsible for applications of flexible, rigid, and solid urethanes.

Mr. Hayes holds a B.S. degree in chemistry from UCLA. He was a research engineer with a chemical research group at Lockheed Aircraft Corp., Burbank, Calif. After being associated with American Latex Products Corp., Hawthorne, Calif., a Dayco Division, he was a project chemist in charge of rigid urethane developments at the Freedlander Research and Development Laboratories, another Dayco Division, for two years.

Armstrong Slates Plant

► Armstrong Rubber Co., West Haven, Conn., has announced that it will build a $25 million tire plant in Hanford, Calif., with a daily production capacity of 10,000 tires. Construction is to begin shortly, with completion slated for late 1961. Except for a section set aside for raw material and finished goods storage, the one million square foot plant will be a one-story structure equipped with tire building, fabric processing and automatic curing equipment. The plant will initially employ 1,000 workers, but employment is eventually expected to increase to 1,600. At present Armstrong has major expansion programs, totaling over $10 million, taking place in four locations.

Moxness Names Keisling

► Woodrow W. Keisling, formerly a silicon rubber specialist, has been raised to the post of production superintendent of Moxness Products, Inc., Racine, Wisc. At Moxness since 1959, Mr. Keisling was previously with the General Electric Co. Sven K. Moxness, president of Moxness Products, announced that the company is undergoing a plant expansion program, scheduled for completion in the latter part of this year.

J. T. Blake

Elected at Simplex Wire

► Dr. John T. Blake has been elected to the new post of senior vice-president in charge of all engineering and manufacturing activities at Simplex Wire & Cable Co., Cambridge, Mass. He has also been elected to the company Board of Directors. In filling two other new executive posts, the board elected John W. Logan, executive vice-president, to direct all operations of the company, and G. J. Crowdes, vice-president, to be responsible for all engineering activities. Mr. Logan was also elected to the Board of Directors. Dr. Blake joined Simplex in 1924, becoming director of research in 1940, and vice-president in 1956. He received the Goodyear Gold Medal for outstanding achievements in rubber research in 1953. A 1921 graduate of Tufts, he received his Ph.D. from M.I.T. in 1924.

Malayan Rubber Meeting

► The Rubber Research Institute of Malaya, with the support of the Government of the Federation of Malaya and the Rubber Producer's Council, will sponsor an International Conference on Natural Rubber Research to be held on September 26 to October 1, 1960, in Kuala Lumpur, Malaya. The conference, the first one since World War II, is the anchor event for a month of meetings that will make Kuala Lumpur the focal point for rubber interests from all over the world. The meeting is expected to draw attendance from delegates of 22 nations.

Low-Temperature Rubber

► The Technical Service Department of the Natural Rubber Bureau, Washington, D. C., has announced a new modified natural rubber that makes possible natural rubber compounds which remain effective at temperatures below —60° C. Developed at the Natural Rubber industry laboratories in London, England, the new rubber is the result of an approach to achieving low-temperature effectiveness. It combines the incorporation of plasticizers to counteract rapid stiffening occurring at very low temperatures, and chemical modification of the rubber resulting in marked retardation in the slow progressive stiffening that occurs at moderately low temperatures.

The compounding procedures and a number of pertinent tests are covered in Technical Bulletin No. 4, Compounding Natural Rubber for Service at Low Temperatures. Write to Technical Service Department, Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D.C.

Armour Adds New Line

► Flexible polyurethane foam has been added to the product line of the Armour Alliance Industries, Alliance, Ohio, with the start of production in an addition to the firm's Los Angeles, Calif. plant. Armour, a leading producer of rubberized curled hair for furniture, automotive and bedding cushion, has decided to manufacture urethane foam because of rapidly growing acceptance of the material for all cushioned products. Armour plans to produce the foam by the "one-shot" process with a foaming machine that is said to have a capacity of about 4,000 pounds of material an hour. Most of the foam produced will be 1.8 pounds per cubic foot density.

Dow Promotes Palmer

► Ted W. Palmer has been appointed product manager to handle chelating agents for the Dow Chemical Co., Midland, Mich. Mr. Palmer will be responsible for the sales programing of Versene chelating agents and Separan flocculants. In the rubber industry, Versene chelating agents have been found useful in polymerization processes and have a wide range of applications in the prevention or solution of problems associated with metal ions. Mr. Palmer joined Dow in 1957 and has been a technical sales representative for Separan, Versene and Dowex ion exchange resins.

Mohawk Staff Changes

► Mohawk Rubber Co., Akron, Ohio, has made four changes in its technical and research departments including the appointment of Leighton Riess as manager of tire compound development in Akron. Mr. Riess, who joined the company in 1958 as technical manager of the Helena plant, previously held technical posts in both the domestic and foreign operations of Goodyear Tire & Rubber Co. Succeeding Mr. Riess in Helena as technical manager is James A. Campbell, who became a member of the technical organization last October. Prior to that, he was with the Firestone Tire & Rubber Co. plants in Akron and New Zealand. Nyle B. Oswalt, who has been with the company since 1952, has been named chief chemist at Helena, while Richard Eckaret, who joined Mohawk from Goodyear in 1959, has been appointed manager of tread rubber and repair material development in the Akron plant.

World Trade Fair Held

► The 4th Annual United States World Trade Fair, with $80 million in goods from 66 countries on display, was held on May 4 to 14 at the New York Coliseum, New York City. Over 500,000 buyers and visitors viewed the over 3,000 exhibits which ranged from light agricultural machinery to small handicrafts. Products on display were classified into five groups. Group One included textiles, clothing, accessories, footwear, handicrafts, furniture and floor coverings; Group Two, national pavilions, tourism, institutional exhibits, information offices and trade services; Group Three, machinery, machine tools, electrical equipment, printing machinery, building equipment and basic materials; Group Four, sporting goods, bicycles and motorcycles, and boat and sports marine equipment; and Group Five, foods, confections, beverages and national restaurants.

Dutch Black Plant

► A new carbon black factory owned by Ketjen-Carbon Ltd., in the Botlek near Rotterdam, has gone on stream. Ketjen-Carbon was established by the Royal Sulphuric Acid Works Ketjen Ltd., Amsterdam, and Godfrey L. Cabot, Inc., Boston, Mass. The plant, with a capacity of 24,000 tons per year, will export more than half of its production. Initially the plant will produce ISAF, HAF, FEF, GPF, and SRF carbon blacks.

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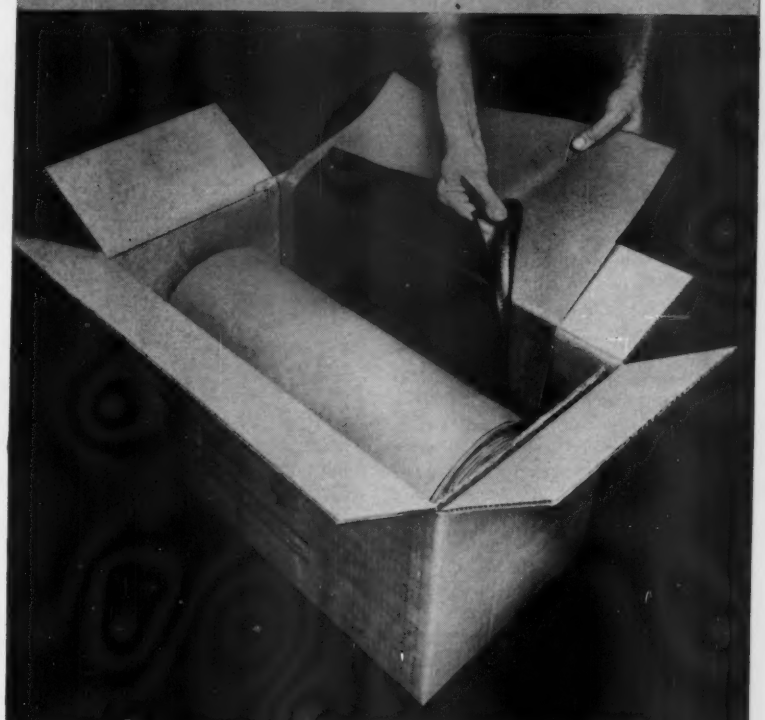

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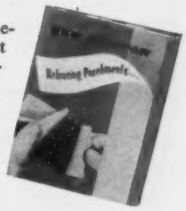

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New Fort Wayne Officers

► The Fort Wayne Rubber & Plastics Group has elected officers and directors for the 1960-1961 season. The newly-elected officers are: *President*, Allen C. Bluestein (Anaconda Wire & Cable); *Vice-President*, Albert L. Robinson (Harwick Standard); *Secretary-Treasurer*, Carroll Voss (General Tire); *Directors*, Bal Connell (General Tire), Jack Lippincott (Dryden Rubber), Al Cobbe (Godfrey L. Cabot), and Jerry Zwick (Goodyear).

The Fort Wayne Rubber & Plastics Group is sponsoring a rubber technology course, designed for persons with limited or no technical background. The course will consist of 12 lectures on rubber and 4 lectures on plastics, and will be given on Thursday evenings at Anaconda Wire & Cable Co. in Marion, Ind. The first lecture is scheduled to begin on September 1; however, there will be no classes during most of December and all of January and February. The basic text for the course will be "Introduction to Rubber Technology," edited by Dr. Maurice Morton, and will be included in the $35 enrollment fee. Persons interested in attending the rubber technology course should contact Allen C. Bluestein, Anaconda Wire & Cable Co., Marion, Ind.

Ohio Rubber Picks Site

► Ohio Rubber Co., a division of the Eagle-Picher Co., Willoughby, Ohio, plans immediate construction of a new plant at Fort Smith, Ark. The plant will be 190,000 square feet in area, will cost about $3 million, and will employ approximately 250 people. It is designed to permit expansion at a later date. Automobile floor mats, molded precision rubber parts for automotive, oil field, and general industry; and semi-pneumatic tires for industrial, agricultural implement and other applications will be manufactured at the plant.

Witco Constructs Plant

► Witco Chemical Co., New York, N. Y., will build a phthalic anhydride plant on the East Coast capable of producing 30 million pounds a year. The company's second such chemical plant, it is needed because of the growing phthalic anhydride requirements of the polyester, plasticizer and paint industries, according to the company.

R. M. Held

Named V-P at Tamms

► Russell M. Held has been appointed vice-president and general sales manager at Tamms Industries Co., Chicago, Ill., with the responsibility of supervising all sales activity. With the company since 1935, he was formerly vice-president in charge of the Trade Sales Division, the packaged goods activity of the company. Mr. Held's appointment was, according to Enos Troyer, president, "to consolidate sales activities and sales policies for the company as a whole, as all product lines continue to expand."

Akron Rubber Renamed

► The Akron Rubber Grinding & Processing Co., Barberton, Ohio, has changed its name to Akron Rubber Grinding & Equipment Co., Inc., to include mention of machinery of all types for the rubber and plastic industries as well as the company's grinding operation. Several personnel changes were also announced. Frank Black has been placed in charge of accounts receivable and payable, Ed Rondy is in charge of the sales of ground rubber and rubber working machinery, and Harry Black has been placed in charge of production and rebuilding of machinery.

Adds Polyglycols to Line

► Polyglycols, major components of urethane foam, have been added to the Vibrathane product group produced by the Naugatuck Chemical Division of U.S. Rubber, New York, N. Y. Included in the Vibrathane group are diisocyanates, casting resins, gums, and chemical additives.

Ontario Group Meets

► The Ontario Rubber Group held a joint meeting with the Wellington-Waterloo Section of the Chemical Institute of Canada on March 8, at the Fischer Hotel in Guelph, Ontario, Canada. Guest speaker at the joint meeting was Frank B. Smith (Naugatuck Chemical), who discussed the subject "Contrasts in the Response of Elastomers to High Temperature Vulcanization."

During his presentation, Mr. Smith covered typical tread and carcass compounds of natural rubber, butadiene-styrene rubber, nitrile, butyl, polychloroprene, and natural-butadiene-styrene blends being vulcanized at temperatures from 292° to 500°F. He outlined the response of these elastomers to the higher vulcanizing temperatures as they were studied in terms of basic physical properties.

Goodyear Low-Cost Tire

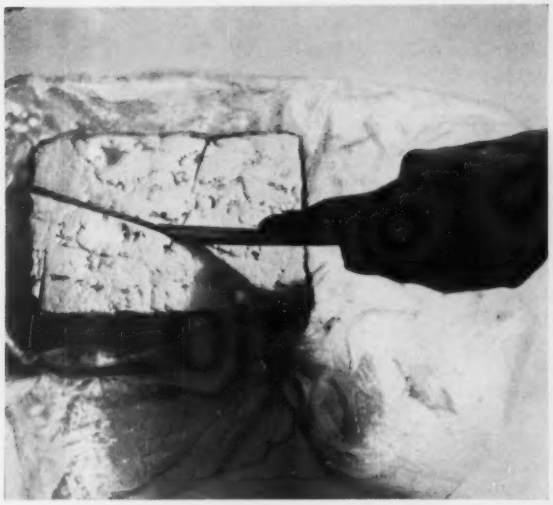
► A low-cost tire with nylon cord is being introduced in the automobile tire replacement market by Goodyear Tire & Rubber Co., Akron, Ohio. According to O. E. Miles, vice-president of Goodyear, the new tire development is in recognition of the modern driver's demand for tires with capacity for sustained high speeds on superhighways, high impact and heat resistance. Built into the tire is the same 3-T nylon cord Goodyear uses in its more expensive replacement tires, including the premium Double Eagle, the company reports. The new tire has a full tread depth in a multiple angle design for non-skid traction, and varying angles in the design supply a continuous road-contacting tread surface for smooth performance and easy steering, the company states.

Firestone Tractor Tire

► An All Traction Utility tractor tire, manufactured by the Firestone Tire & Rubber Co., Akron, Ohio, and designed for on and off-the-road jobs, is now available as original equipment on new tractors. The tread of the new tire features shorter, wider traction bars that give 58 per cent more tread contact area. Advantages, according to the company, are greater traction for off-the-road jobs, and double the tread life on hard surface roads. The tire is made with shock-fortified cord body for greater resistance to impact breaks, and Firestone Rubber-X tread rubber. It has six-ply construction for tough industrial work.

Now . . .

a SULFUR DISPERSION... at a price you can afford to pay!



This stiff paste consists of 80 parts of sulfur and 20 parts of KENFLEX N.

These hard granules consist of 80 parts of sulfur and 20 parts of KENFLEX A.

Dispersions of powdered rubber chemicals have gained rapidly in acceptance and efficiency but until now the difficulties of combining sulfur with suitable vehicles have resulted in costs higher than most compounds can bear.

Now, KENRICH PETROCHEMICALS, pioneer in the field of dispersions, has perfected a method of combining sulfur with KENFLEX Resins and process oils that not only results in a better product than earlier combinations, but is far less expensive as well. The new KENFLEX sulfur dispersions can be a combination of from 80 to 90 parts of sulfur with KENFLEX A, L or N, or any process oil of your choice. The dispersion can be in granular, block or stiff paste form.

Write or phone today for information. We will be glad to quote prices for your combination of sulfur and vehicle.

KENRICH also has available a complete line of KENMIX Dispersions. If you haven't yet tried these products in your plant, let us prepare samples of powdered rubber chemicals with the vehicle of your choice in the form best suited to your needs. Call or write today.

KENRICH PETROCHEMICALS, INC.
57-02 48th STREET, MASPETH 78, NEW YORK

Names in the News

F. R. Perego has been named general manager of the Brampton, Ontario, Canada, plant operations of the General Latex & Chemical Corp., Cambridge, Mass.

A. F. Thomas has been appointed to the newly-created post of sales manager for the Films & Flooring Division of Goodyear Tire & Rubber Co., Akron, Ohio.

Stanley Messing has been appointed sales manager of Minor Rubber Co., Inc., Bloomfield, N. J.

Richard D. Rosenberg has been named vice-president in charge of international operation for Dayton Rubber Co., Dayton, Ohio.

Ralph E. Carpenter, Jr. has been elected to the board of directors of Lee Rubber & Tire Corp., Conshohocken, Penna.

Bryan Putnam has been appointed manager of public relations of Goodyear Tire & Rubber Co., Akron, Ohio, succeeding **Herbert G. Wilson,** who has been named to the newly-created post of company historian.

Dr. Herschel H. Cudd, vice-president in charge of research and development at American Viscose Corp., Philadelphia, Penna., has been named president of AviSun Corp., jointly-owned affiliate of American Viscose and Sun Oil Co.

Hugh R. Tobey has been named a development engineer at Castle Rubber Co., Butler, Penna.

Peter Thomas has been appointed a product development chemist at the Silicone Products Department of General Electric, Waterford, N. Y.

A. M. Kahn, president of the Acme-Hamilton Manufacturing Co., Trenton, N. J., and Spear & Co., has been named a trustee of the Jewish Hospital of Brooklyn, N. Y.

Dr. William A. Jones, a research chemist, has been named by Texas Butadiene & Chemical Corp., Channelview, Tex., to work on synthesis research at the company's Miami plant.

Harold B. Lawson has been elected secretary of United Carbon Co., Charleston, West Va., while retaining his present position as vice-president of finance.

John A. Cover and **Bodie C. Pryor** have been named technical manager and manager of polyethylene operations respectively of the Port Neches, Tex., plant of Goodrich-Gulf Chemicals, Inc.

Dr. Joseph Iannicelli has joined the Borger, Tex., laboratory of J. M. Huber Corp., New York, N. Y., as a senior research chemist.

Prof. Charles G. Overberger, head of the Department of Chemistry of the Polytechnic Institute of Brooklyn, was presented with the 1960 Honor Scroll of the New York Chapter of the American Institute of Chemists.

Paul E. H. Leroy, chief fiscal officer at Goodyear Tire & Rubber Co., Akron, Ohio, for over 20 years, has retired after 40 years with the company. He was a director as well as vice-chairman of the board.

Louis Moretti, formerly general superintendent at the Passaic, N. J. plant of the U. S. Rubber Co., New York, N. Y., has been named factory manager of the plant.

Oscar W. Kaalstad, formerly a member of the Chemical Engineering Department of the Massachusetts Institute of Technology, has joined the Organic Chemicals Division of the Dewey and Almy Chemical Division, W. R. Grace & Co., Cambridge, Mass., as manager of the Sales Development Department.

Donald R. Kronenberger has been elected comptroller of the Seiberling Rubber Co., Akron, Ohio, succeeding **Charles E. Jones,** who has retired as vice-president and comptroller.

C. Wells Moore, Jr., president and owner of Moore Textiles, Dalton, Ga., has been retained in a sales advisory capacity by Southern Latex Corp., Austell, Ga.

Raymond E. Thomas, chief clerk in the company's Retail Service Division since 1951, has been assigned to develop statistics for control of retread plant operations for B. F. Goodrich Tire Co., Akron, Ohio.

Robert C. Schroeder, former market manager in the Product-Marketing Section of the Sales Department of Union Carbide Plastics Co., New York, N. Y., has been appointed manager of film and sheeting for the company.

James G. Shannon, Jr. has been appointed regional manager of Tyrex Inc., Detroit, Mich.

John Sabot, who joined Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, in 1956 as a project manager, has been appointed coordinator of manufacturing operations.

B. Hunter Loftin and **Ray F. Weston, Jr.,** have been named directors of the F. H. Maloney Co., Houston, Tex., and the latter has also been named secretary-treasurer of the company. **William B. Campbell** has been appointed vice-president, technical services.

James T. Norman, formerly in Japan assisting in the construction and initial operations of the first synthetic rubber plant built in that country, has been named technical service engineer for the International Department of B. F. Goodrich Chemical Co., Cleveland, Ohio.

Kenneth J. Jones, formerly Chicago District sales manager for the Celotex Corp., has joined Tamms Industries Co., Chicago, Ill., as sales manager of the Trade Sales Division.

Charles C. Colozzi has been elected president of the U. S. Gasket Co., Plastics Division of Garlock Inc., Camden, N. J.

Henry P. Donohue, Jr., formerly eastern regional sales manager of non-ceramic industries in the Minerals & Chemicals Division, has been appointed market development manager, Titania, of the newly-created Development Department of Godfrey L. Cabot, Inc., Boston, Mass.

G. A. Wolff has been appointed manager for polymer sales of Putnam Chemical Corp., and will supervise the selling of polymers in the United States for the company.

Now! another cost-cutting *fmc* development

Newest addition to FMC's widely diversified line of magnesias . . . gives neoprene and synthetic rubber compounders these advantages:

High bulk density!
To work into the batch more readily.

Finer particle size!
To provide better dispersion and distribution throughout the batch.

High adsorptive capacity!
For excellent anti-scorch properties.

Economical!
Produced by an exclusive FMC process! Amply available at an attractive price.

Samples and data on request!

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Putting Ideas to Work

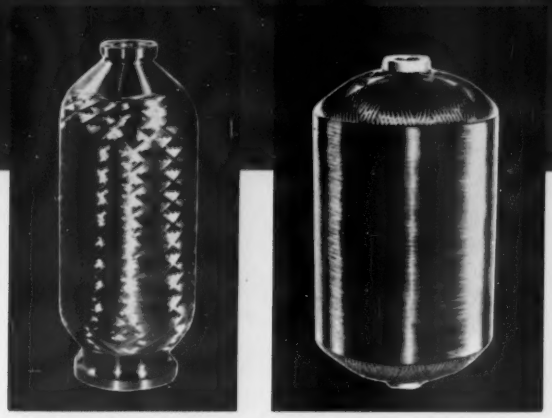
FOOD MACHINERY AND CHEMICAL CORPORATION
Mineral Products Division
General Sales Offices:
161 E. 42nd STREET, NEW YORK 17

NS SPECIAL WIRE (575,000 psi) WRAPS

In the development of solid-fuel rocket cases, a leading manufacturer fabricated and experimented with welded steel and glass fibers, as well as many steel wire specimens, to find a fuel case material with the most favorable strength-to-weight ratio for fuel case applications.

EARLY DEVELOPMENT STAGES—At the outset of their testing program, the rocket manufacturer asked National-Standard to develop .004″ wire with 575,000 psi, the ultimate tensile strength required of steel wire to provide the strength-to-weight ratio needed. The wire was to be made into tapes of uniformly-stressed wires, coated with epoxy resin to separate the wires, and wound over collapsible mandrels to form the fuel case.

NATIONAL-STANDARD ENGINEERS produced .004″ high-carbon steel wire that met every specification, after intensive testing with many types of wire and finishes. Special wire developed by NS met rigid size tolerances, residual twist and controlled cast requirements.



WIRE-WRAPPED ROCKET CASES are wound over collapsible mandrels using a number of strands of very high strength, small diameter wire formed into tapes.

ROCKET FUEL CASES

The end result of NS—customer cooperation was the ability to produce wire-wrapped rocket cases with very high hoop stress and lower cost than those being produced by other methods. And the fuel case manufacturer is able to provide maximum case-to-case reliability.

EXPERIENCED ENGINEERING HELP of this kind is available to you from National-Standard to meet special or unique high-quality wire applications. Write for additional information to National-Standard Company, Niles, Michigan.

NS NATIONAL-STANDARD COMPANY

Manufacturer of Specialty Wire and Metal Products

NATIONAL-STANDARD COMPANY

Niles, Michigan

NATIONAL-STANDARD PLANTS ARE SERVICE-LOCATED NEAR YOU...

National-Standard Company is a specialized manufacturer of high-quality wire, wire cloth, flat spring steel, perforated metal, and other products. With manufacturing and warehousing facilities around the world, National-Standard is ideally organized to serve your special wire or metal product requirements. For fast delivery or engineering services, contact the National-Standard plant or warehouse nearest you.

NATIONAL-STANDARD DIVISION

Music spring wire, stainless steel wire, super-alloy wire, plated wire, tire bead wire, flat and tubular braid.

Niles, Michigan
Akron, Ohio
Los Angeles, California
Kansas City, Missouri

ATHENIA STEEL DIVISION

Cold rolled high-carbon flat spring steel, tempered or annealed; alloy steel, high-carbon and stainless steel, flat wire.

Clifton, New Jersey

REYNOLDS DIVISION

Wire Cloth Plant — ***Dixon, Illinois***
Full range of weaves, metals, and coatings; specialty weaves.

Cross Perforated Metals Plant — ***Carbondale, Pennsylvania***
Commercial, ornamental and industrial perforated metals.

WORCESTER WIRE DIVISION

Fine high and low carbon wire, music spring wire, stainless steel wire, plated wire, other specialty wires.

Worcester, Mass.

WAGNER LITHO MACHINERY DIVISION

Metal decorating equipment — ***Secaucus, New Jersey***

NATIONAL-STANDARD *plants and facilities are also located in Guelph, Ontario; Kidderminster, England; Port Elizabeth, South Africa; Cologne, West Germany; and Mexico City, Mexico.*

WAREHOUSES

NATIONAL-STANDARD WAREHOUSE, ***Plainville, Conn.***
Music spring wire and stainless steel wire, high-carbon cold-rolled annealed strip and spring steels.

NATIONAL-STANDARD WAREHOUSE, ***Akron, Ohio***
Music spring wire and stainless steel wire.

WAREHOUSE DISTRIBUTORS

CENTRAL STEEL & WIRE COMPANY, ***Chicago, Illinois***
Music spring wire.

KRUSEN WIRE & STEEL COMPANY, ***Los Angeles, California***
Music spring wire and stainless steel wire, high-carbon cold-rolled annealed strip and tempered spring steels.

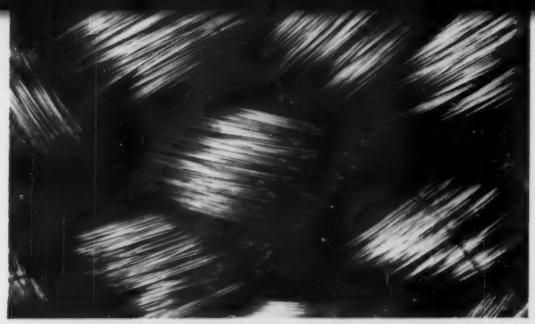
LAPHAM-HICKEY STEEL CORPORATION, ***Chicago, Illinois***
High-carbon cold-rolled annealed strip and tempered spring steels.

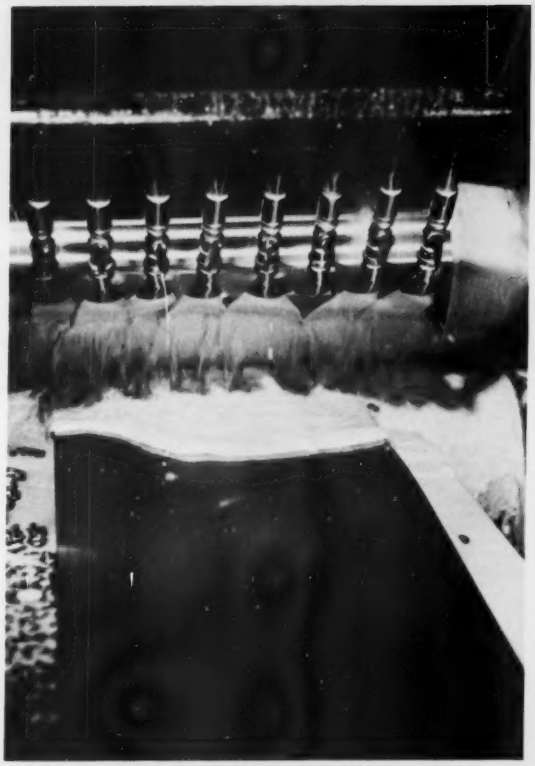
VOSS-DAVIDSON STEEL COMPANY, ***Detroit, Michigan***
High-carbon cold-rolled annealed strip and spring steels.

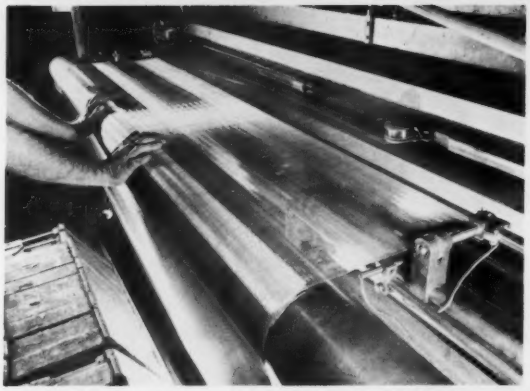
DISTRIBUTORS of CROSS *Perforated Metals are located in major industrial areas. See your local classified telephone directory.*

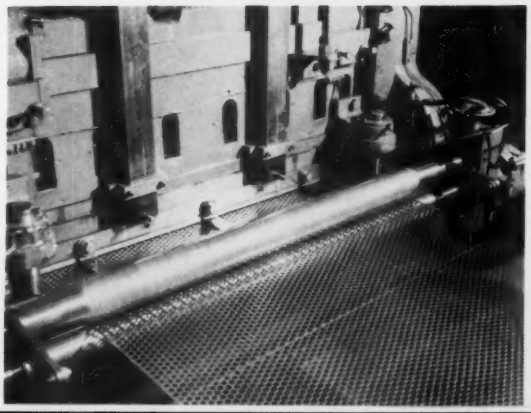
NS NATIONAL STANDARD COMPANY

NATIONAL-STANDARD COMPANY
Niles, Michigan

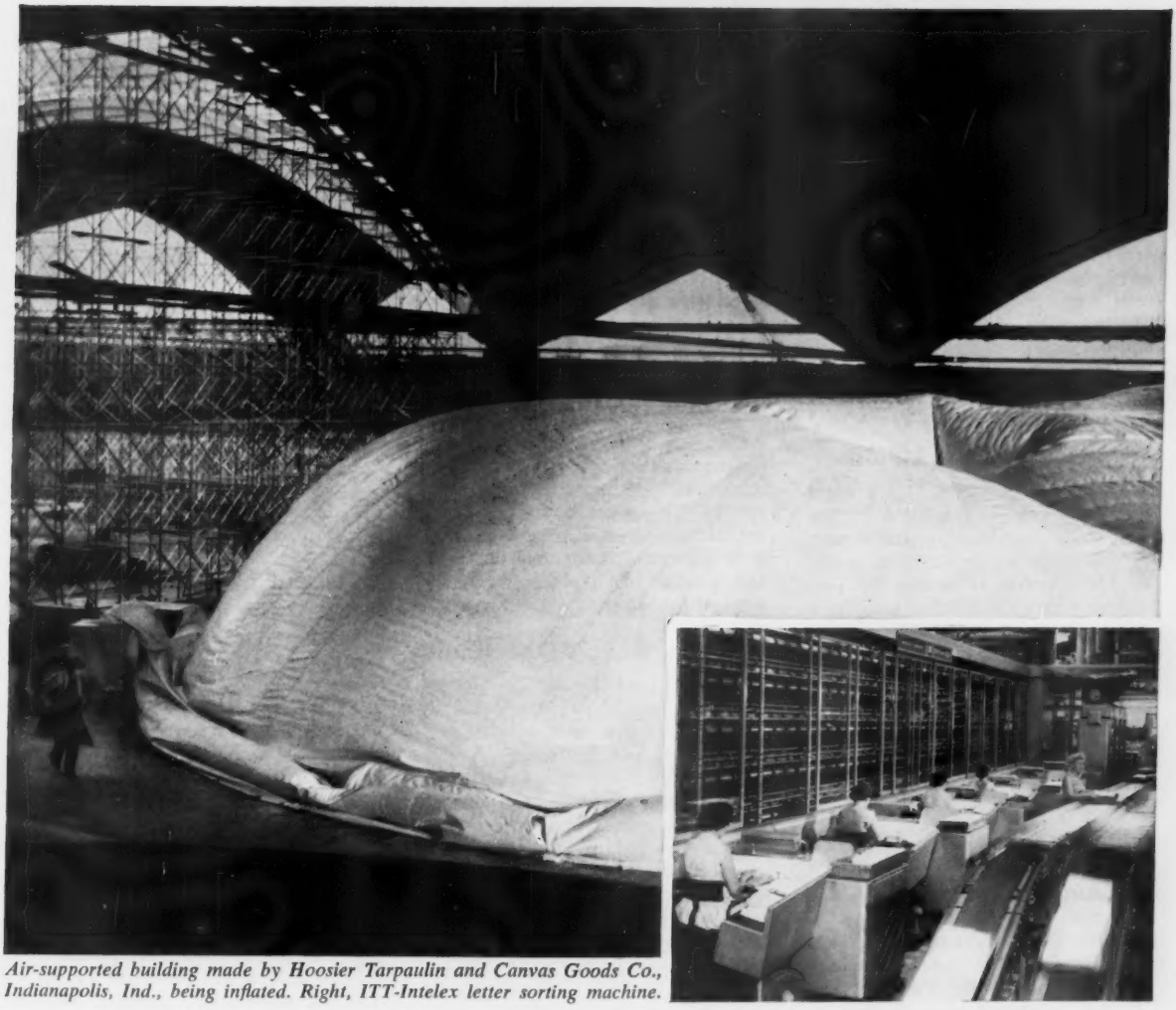








Huge fabric building speeds construction of first push-button post office



Air-supported building made by Hoosier Tarpaulin and Canvas Goods Co., Indianapolis, Ind., being inflated. Right, ITT-Intelex letter sorting machine.

The world's first fully mechanized post office—a "laboratory for the future" which promises to revolutionize mail handling—is scheduled for completion in Providence, R. I. this October.

To meet this deadline, sensitive electro-mechanical machinery for sorting letters at high speeds had to be installed even before the walls of the building went up. The problem: How to protect it during installation?

Answer: They erected a building within a building. A huge fabric air-supported structure—one of the largest of its kind—was fabricated for International Telephone and Telegraph.

The base fabric selected for this vital job was Wellington Sears Welkote, a tough nylon, coated with vinyl by Sawyer Coated Fabrics, Division of Farrington Texol Corp., Watertown, Mass.

This is just one of the many ways Wellington Sears meets the complex needs of industry with quality fabrics backed by more than a century of experience. Why not call on Wellington Sears to help solve your problems with fabrics for laminating, coating, rubberizing and many other industrial applications. Write for free illustrated booklet, "Fabrics Plus," Dept. G-7.

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FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

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Financial News

Witco Chemical

► Quarter ended March 31: Net income totaled $585,400, or 76c per share, an increase of 28 per cent over $457,800, or 60c per share, for the comparable period the previous year. Sales and other income for the quarter were $15,249,800 as compared with $12,893,100 for the same period in 1959, an increase of 18 per cent. The favorable first quarter figures were attributed to generally good business conditions, coupled with continuing growth of productive capacities of the company. Sales and net income reported include, for the first time, the results of operations of Witco Chemical Co., Ltd., a wholly owned English subsidiary.

Mohawk Rubber

► Quarter ended March 31: Increases of 18 per cent in sales and 22 per cent in earnings were reported with profit amounting to $281,000, equal to 57c a share, as against the preceding year's $230,000, or 47c a share. Sales reached $6,976,000 as compared with last year's $5,900,000. H. M. Fawcett, company president, noted that sales in all divisions ran well ahead of last year, and stated that he expects the company to exceed its record levels of 1959 when earnings were $1,219,347 on sales of $31,656,633.

Nat'l Vulcanized Fibre

► Quarter ended March 31: Net earnings were $550,000, equal to 77c per share, comparable to $415,400, or 70c per share in the first quarter of 1959. Sales topped those for any quarter of 1959, totaling $6,720,920 as against $4,539,902 for the first three months of 1959. Company President Eugene R. Perry said the first quarter performance represented "continued progress at a rate of increase a little better than will probably be realized for the year."

Acme-Hamilton

► Quarter to March 31: Earnings of $471,466, equal to 14 cents a share, were reported, as compared to $11,337 for the like period of 1959. In the year ended Dec. 31 the company lost $203,736 on sales of $3,448,981, compared with a loss of $377,760 on sales of $4,585,232 in 1958.

U.S. Rubber

► Quarter ended March 31: Net profit was $9,947,886, equal to $1.51 a share of common stock, compared with $10,198,798, or $1.55 a share in the same period last year. Sales for the period were $254,099,601, compared with $249,303,208 in the first quarter of 1959. Current assets on March 31 were $468,406,338, compared with $450,516,562 a year earlier, and current liabilities were $149,382,986, compared with $148,167,568.

Goodall Rubber

► For 1959: Sales rose by 27 per cent to $13,915,301 compared to $10,961,650 in 1958, with profits for the year up 36 per cent to $492,359, equal to $1.03 per share of common stock. In 1958, profits were $361,848, or 75c per share. Dividends on the common stock were paid at quarterly intervals throughout the year and totaled 50c a share, the same amount paid in the last three years.

DuBois Chemicals

► Year ended February 29: Net income reached $2,345,000, equal to $1.03 per share, and consolidated net sales were $25,304,000. A new issue of 200,000 common shares of the company's stock is being offered at $13.50 a share. The proceeds will be used to reduce bank loans and to increase working capital.

Cooper Tire & Rubber

► For 1959: Net income for the year reached $1,341,116, as compared to $956,729 in 1958, with net sales for last year amounting to $37,710,366, contrasted with $31,042,481 in the previous year.

Midwest Rubber

► Six months ended April 30: Net income was $457,502, or $1.24 per share, as compared with $467,868, or $1.26 a share for the like period a year ago. Net sales of $6,178,413 topped the figure of $5,725,065 for the same period a year ago.

Anaconda Wire

► Quarter ended March 31: Income for the quarter dropped to $320,230, or 38c a share, as compared to $767,600, or 91c for the like period of 1959.

Thiokol Chemical

► Quarter ended March 31: Net earnings were $817,820, equal to 18c a share, a decrease of 37 per cent from the 1959 first quarter figure of $1,308,173, equal to 29c a share. However, net sales for the quarter rose to $41,996,134, as contrasted with the figure of $34,949,867 for the like period of 1959. An explosion at the company's Longhorn facilities earlier this year interrupted usage of liquid polymers manufactured by the Chemical Division and contributed to a 35 per cent reduction in Chemical Division sales.

Hewitt-Robins

► Quarter ended March 31: Consolidated net sales were $11,800,372, an 8 per cent increase from the $10,877,128 net sales in the same quarter of 1959. Net earnings after taxes, before preferred dividends, were $110,554, compared with $87,581 in last year's first quarter, and earnings per share of common stock were 25c, as against 18c for the like period a year ago.

McNeil Machine

► Quarter ended March 31: Income reached $1,140,990, equivalent to 94c per share on common stock, for a rise of 66 per cent above the $689,743 reported for the first quarter of 1959. A quarterly dividend of 25c was voted on common stock, payable June 14. Both earnings and sales represented a record high in the company's first quarter.

Flintkote

► Quarter ended March 31: Net income for the period was $1,303,114, equal to 20c per share, compared to $1,874,235, or 32c per share for the like period of 1959. Sales of $45,984,581, compared to $45,469,834 for the first quarter of 1959.

Acushnet Process

► For 1959: Net income for the year totaled $558,882, or $2.21 per share, as contrasted with $460,723 in 1958, and $1.81 earned per share. Net sales for last year were $18,668,013, against $14,466,166 in 1958.

Belden Manufacturing

► For 1959: Net income totaled 2,019,231, or $5.11 per share, as compared to $22,804,972, or $2.29 per share, in 1958. Net sales of $30,004,539 topped the $22,804,972 sales mark of 1958.

Call Hall

HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 11

RECLAIM SCORCHED NEOPRENE WITH 4039-Y OIL!

For reclaiming and reconditioning scorched Neoprene, 4039-Y Reclaiming Oil is ideal for both scorched scrap and partly "set-up" stocks.* Tests show that it can also save time and production costs in the reclamation of regular rubber. Only 5% of 4039-Y Reclaiming Oil will completely recondition scorched Neoprene depending on how far such stocks have been set-up. 4039-Y treated stocks can be worked back into the original stock or used as a workaway in other stocks. General properties of 4039-Y Reclaiming Oil are as follows:

Specific Gravity @ 60/60° F.	0.938
Saybolt Universal Viscosity @ 100° F.	40 seconds
Flash Point, C.O.C.	180° F.
Weight per gallon in pounds	7.81
Color	Dark Brown

P.S. Use "Maglite D" in your Neoprene batches and avoid scorching!

NEW MAGNESIA CURES IN VITON® A ARE MAGLITES® Y, D AND M

Various grades of magnesia perform differently in Viton, producing varying degrees of activity related to specific surfaces. The end-use of the Viton product determines which Maglite is best.

With Viton A and 1.5 phr Diak No. 1 Maglite Y gives superior results for low compression set. . . . For non-supported articles in hot air service. . . . For parts exposed to di-2-ethylhexyl sebacate. . . . For general mechanical goods where best balance of properties are required for heat, hydraulic fluid, lubricant and fuel resistance. Maglites D or M are recommended for fabric coated or supported sheet for hot air applications.

They show little or no modulus increase, only slight increase in hardness and no loss in elongation during exposure to hot air. Loss of tensile strength should not be critical since they are supported. Both also give outstanding service in silicate-ester hydraulic fluid (MLO 8200) whether supported or not. Manufactured by: Merck & Company, Inc. Sold by: The C. P. Hall Co. For more complete details write for our new Bulletin #5821A entitled "Magnesia Cures in Viton® A."

VITON® A is a registered trademark of the E. I. duPont de Nemours Co.
MAGLITE® is a registered trademark of Merck & Company, Inc.

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West Coast News

► The presentation of nine papers, each followed by a discussion period, highlighted the First Annual Technical Conference of the Los Angeles Rubber Group, Inc., held June 1 and 2 in the Hotel Mayfair Gold Room, Los Angeles, Calif. Dr. E. G. Partridge was moderator of the Wednesday session. Papers and their authors were: "The Rotomill, A Continuous Mixing Device," A. E. Juve, J. R. Beatty, (Goodrich); "Latex Masterbatching, Compounding, Developments, Future Possibilities, and Influence on Rubber Manufacture," I. Drogin (United Carbon); "*Cis-trans* Isomerization in Natural Polyisoprenes," J. I. Cunneen (British Rubber Producers' Research Association); "A Towing Device for Estimating Road Wear," L. P. Gelinas, E. B. Storey (Polymer); "Silicone Rubber — Today and Tomorrow," P. C. Servais, K. E. Polmanteer (Dow Corning). The papers were presented by Messrs. Juve, Drogin, R. F. Wolf, Storey, and Servais.

Dr. H. L. Fisher was moderator at the Thursday session. The Thursday papers and their authors were: "Compounding *Cis* - Polybutadiene," H. E. Railsback, C. C. Biard, J. R. Haws (Phillips Petroleum); "A Practical Method of Classifying All Elastomeric Vulcanizates," N. L. Catton, (Du Pont), R. C. Edwards (Chrysler Engineering), T. M. Loring (Michigan Precision Molded); "Worldwide Development in Tire Production," C. A. Litzler, (C. A. Litzler); "Contrasts in Response of Elastomers to High Temperature Vulcanization," F. B. Smith (Naugatuck Chemical). The papers were delivered by Messrs. Railsback, Catton, Litzler, and Smith. The session was followed by a trip to the Tlargi Rubber Foundation laboratory.

On the committee for the conference were: Dr. E. G. Partridge, A. J. Hawkins, Jr., R. D. Sullivan, H. R. Fisher, B. R. Snyder, J. W. Arensmeyer, A. T. Lipsky, H. W. Sears, and D. C. Maddy.

The paper, "*Cis-trans* Isomerization in Natural Polyisoprenes," dealing with work done by Dr. J. I. Cunneen, and presented at the conference by Ralph F. Wolf, director of the Technical Service Division of the Natural Rubber Bureau, Washington, D. C., dealt with a method of chemical modification to slow the rate of stiffening and the loss of elastic properties of natural rubber which has been vulcanized and stored at low temperatures. The resulting new rubber, Anti-Crystallizing Natural Rubber, stiffens at a rate as much as 1,000 times slower than normal natural rubber. The process consists of mixing butadiene sulfone into the rubber and heating the mixture for a few minutes. Sulfur dioxide gas is released from the butadiene sulfone, accomplishing a rearrangement of rubber molecules.

► A West Coast sales office has been set up by the Hobbs Manufacturing Co., Worcester, Mass., makers of web winding equipment, die presses, hand and power shears, slitters and rewinders. It will be headed by Kenneth Clay who has been with Hobbs for ten years.

► R. D. Abbott Co. has been appointed West Coast representative for the sale of the accelerator activator Ridacto, produced by Spencer Products Co., Inc., Ridgewood, N. J.

► Arch Mease, Western district manager of the Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Wilmington, Del., since 1946, received a live donkey and other gifts at a retirement party given for him recently in Los Angeles. The donkey was saddled with a bag of neoprene on one side and a bag of Hypalon synthetic rubber on the other.

► Mark Scott, sportscaster, actor, and announcer, was guest speaker at the May 3 dinner meeting of the Los Angeles Rubber Group, Inc., held at the Biltmore Bowl of the Biltmore Hotel.

► Donald D. Davidson has been elected a vice-president of the Golden Bear Oil Co., Los Angeles, Calif., by the board of directors of the company. The appointment was effective February 25.

Appointed by Goodyear

► John F. Bennett has been appointed treasurer of Goodyear Tire & Rubber Co., Akron, Ohio, filling the vacancy caused by the death of Donald H. Walker 11 days after Mr. Walker's appointment to the post. At the same time Willard R. Booth and John Davies were promoted to assistant treasurer. Mr. Bennett had been assistant treasurer since 1946. He holds a mechanical engineering degree from the Massachusetts Institute of Technology. After holding financial posts for the company both here and abroad, he was named financial director of Goodyear-Australia, and then served as assistant treasurer of Goodyear Aircraft Corp.

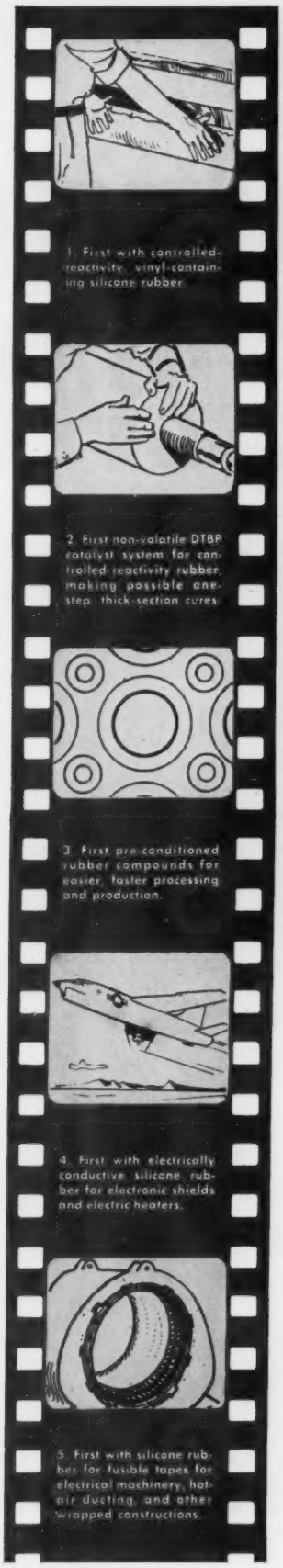
Mr. Booth, with Goodyear since 1929, was in the Treasury Department of the company for five years. He served abroad for 25 years, holding such posts as secretary-treasurer of Goodyear subsidiaries in Brazil, Sweden and Argentina; vice-president and general manager in Cuba; and, recently, financial director and secretary in England. Mr. Davies joined Goodyear in 1957 as a member of the Tax and Insurance Department. He was recently made assistant manager of the department.

Richardson Names Three

► Three new appointments have been announced by the Richardson Co., Melrose Park, Ill., in its sales and customer service operations. A. E. Wolfinger, formerly branch manager of the New York-New Jersey operations, has been named assistant sales manager, Plastics Division, and will be based in the company headquarters in Melrose Park. E. G. Whalen, former field sales engineer, has been appointed manager of the New York-New Jersey branch located in New Brunswick, N. J. Another field sales engineer, K. D. Rhoads, has been appointed branch manager of the newly-established branch office in Philadelphia, Penna.

Rubbermaid Licensed

► Rubbermaid, Inc., Cleveland, Ohio, has been licensed by Spencer Chemical Co., Kansas City, Mo., to use the Engle process, which makes possible injection molding of large polyethylene parts, in a projected pilot operation for the manufacture of large polyethylene products. The operations, to start in October, will include production of storage drums, carboys and acid vats.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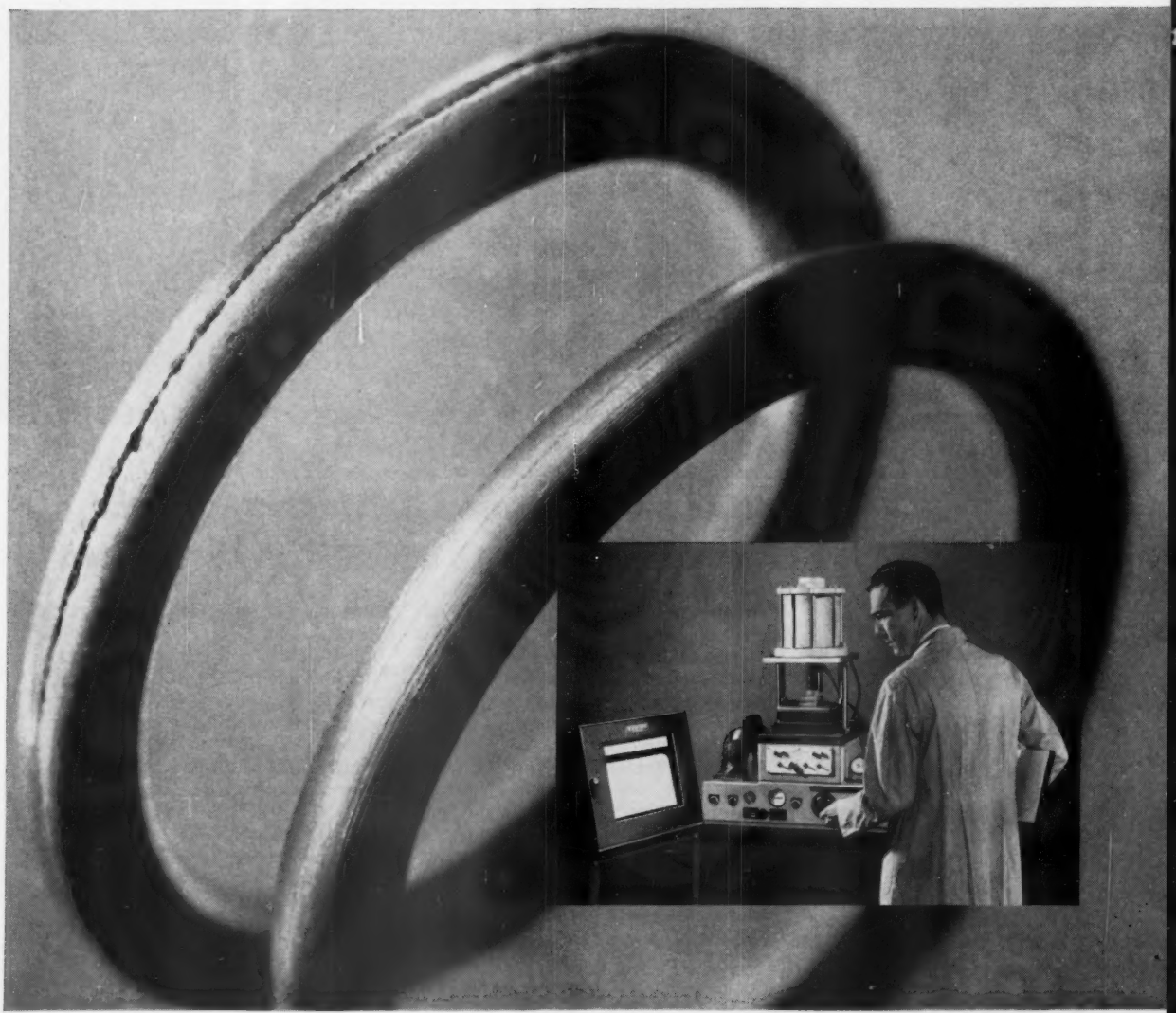

FLUOREL 2141 "O" ring, bottom. Note freedom from defects because of the improved scorch characteristics of FLUOREL Elastomer "O" ring as opposed to elastomer at top of photograph. Inset, FLUOREL 2141 undergoing Mooney Scorch Rating Test.

in elastomers...

Its Mooney Scorch Rating is ideal for the fluorinated rubber processor because it makes possible fast, more economical cures with fewer defects, less scrap, fewer rejected parts. Material can be reprocessed with greater safety.

A significant breakthrough in elastomer processing has been made possible by 3M Research through development of its new FLUOREL 2141 Elastomer.

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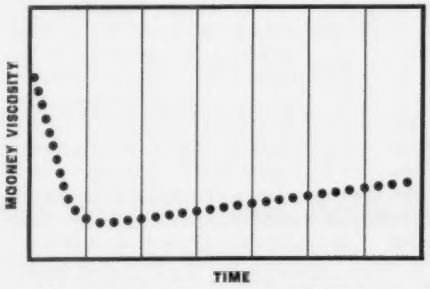

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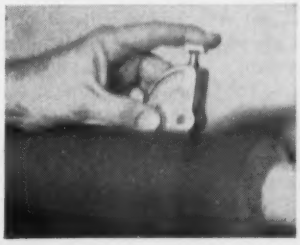

PLASTICIZES PRINTING ROLLERS TURPOL® Brand Plasticizer NC-1200 was the only one of 112 plasticizers that properly retained the dimensional stability of Ideal Roller & Manufacturing Company's synthetic rubber rollers for close tolerance work. This non-toxic chemical softens the rollers, but it does not leach out in oils or solvents.

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3M COMPANY

Canadian News

► The Crown-owned Polymer Corp., Sarnia, Ontario, which operates as an independent producer of synthetic rubber, has been running into export difficulties—a major problem as the company produces a great deal more synthetic rubber than can be absorbed domestically — and the Government's concern about the situation is borne out by the start of the first full-scale cabinet committee inquiry into the situation.

In 1960, while Canada's total rubber consumption will be 110,000 tons, half of which will be synthetic, Polymer will produce over 140,000 tons of synthetic, or about 2½ times domestic consumption. Industry figures feel that the only solution for the company is to assure a continued market in Europe. With 70 per cent of Polymer's total production going to world export markets, and the world industry entering even stiffer competition, Polymer's future profit picture, based solely on its present Sarnia operation, is clouded, they say. Additional capital expenditures, it is felt, will be necessary to handle further market growth and product specialization, and particularly to provide the facilities to make the new-type synthetic rubbers.

Another difficulty Polymer faces is the current European trade situation. There the development of the Common Market—the Inner Six—with its common tariff against the rest of the world, and the Outer Seven free trade area led by Britain, are now seen as a serious threat to Polymer. Major expansion with construction of a plant within the Common Market tariff wall would seem to be the answer, but the Government may not be willing or able to undertake this expansion. Top level opinion in Ottawa has held that Polymer will be sold if production outside Canada proves necessary to protect the future of Canada's only synthetic rubber producer.

There is some bitterness among officials close to the industry over Ottawa's failure to heed studies which, since 1953, forecasted the large growth of synthetic rubber plants around the world; and Government failure to follow the United States' lead in turning over all synthetic rubber plants to private interests in 1955. (Formation of Polymer had been a wartime measure when the Japanese cut off supplies of natural rubber.) "I believe Polymer should have been sold a year ago," said R. C. Berkinshaw, chairman and president of Goodyear Tire & Rubber Co. of Canada, and Polymer's first president, from 1942 to 1945.

Some in the industry feel that a $75 million offer to buy Polymer made by Ventures Limited a year ago may have been a much higher price than Polymer could command at this time, and that it is questionable whether a single private company could handle the gigantic operation.

Defense Production Minister O'Hurley, the official directly responsible for the future of Polymer, has indicated that if sales cannot be maintained and expanded under public ownership, the company may be sold. The committee appointed to study the situation will consider three courses: increasing development to cover rising orders; cutting by-product output and maintaining the Crown corporation at its present capacity; and selling the whole firm. It must decide whether public ownership reduces the sales possibilities more than a change of ownership might do.

The Government is reluctant to move Polymer into private hands for more than one reason. It returns a nice annual dividend to the federal revenues. Also, its export sales are an important contribution to the Canadian economy and to the precarious balance of trade. The Canadian cabinet, furthermore, will want to be assured that private owners can maintain or exceed the successful record of the public firm.

E. R. Rowzee, Polymer president, paints a fairly favorable picture of Polymer at this time. "Our production is up marginally at an all-time high (about 300 million pounds of rubber yearly) and we continue to export and stockpile in Europe. Since it is essential that we remain competitive, we have had to adjust some of our prices. Our competitors —there are now about 12 competing plants in Europe alone—continue to make certain concessions beyond the 'official' price, either above-board or under-the-table.

► The recent announcement by Greig B. Smith, manager and secretary, Rubber Association of Canada, at the annual meeting, that consumption of rubber is only holding its own with 1959 consumption came as a blow to industry members who had predicted at the start of the year a rise of about 5 per cent.

In addition, rubber imports are exceeding even the 1959 figure which was up by 16 per cent to a value of $42,209,000. Bicycle tires and tubes are up 36 per cent and 62 per cent respectively over 1958; rubber-soled canvas shoes and waterproof rubber footwear, up 38 per cent and 113 per cent; and rubber clothing, up 103 per cent. Mr. Smith predicted that import competition will remain as stiff this year.

The 1959 Canadian consumption of new rubber, natural and synthetic, rose to a new peak of 101,478 long tons in 1959, an increase of 21 per cent over 1958 and 11 per cent over the previous record consumption year of 1958. However, Mr. Smith warned that little significance can be attached to a reversal of the downward export trend that has been in evidence in the postwar period. In commenting on a sizeable increase in export of rubber products from Canada from $7,885,000 in 1958 to $11,582,000 in 1959, Mr. Smith said "It is reasonable to assume that it was a strictly temporary upsurge attributable to a prolonged and widespread strike in the United States."

Exports for the first two months of this year at $1,258,276 show a decline again from $1,490,616 for the same period of last year.

On the domestic scene, synthetic rubber accounted for 56.4 per cent of total new rubber used, compared with 55.7 per cent in 1958. The average price of natural rubber was 30 per cent higher during the year.

Sales of tires rose to a record of 8,686,000 units, an increase of 9½ per cent over the previous year, and new records were also established in sales of tire tread rubber and foamed rubber. Sales of major types of industrial rubber products rose moderately, but sales of rubber footwear remained depressed by a further big increase in imports, mainly from Japan, Hong Kong and Czechoslovakia.

► M. L. Snyder & Son, Philadelphia, Penna., is now manufacturing sponge rubber drum gaskets at its factory in Woodbridge, Ontario.

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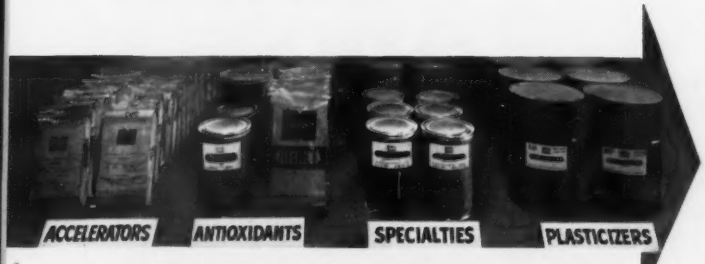

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Obituaries

Charles A. Reed

► Charles A. Reed, former assistant to the president of the Seiberling Rubber Co., Akron, Ohio, died of a heart attack March 23 in Charlotte, N.C. He was 71 years old and had retired in 1955, the oldest employee in terms of service. Mr. Reed was the third person hired by F. A. Seiberling on November 16, 1921, the day the company was founded. However, his association with the Seiberlings began even before that. In 1914, when F. A. Seiberling was president of the Goodyear Tire & Rubber Co., Akron, Mr. Reed joined the Sales Department of that company. Before coming to Akron in 1914, he was a wholesale specialty salesman traveling out of Chicago. At Seiberling he served as manager of service, government, manufacturers, mileage and truck tire sales departments and as assistant sales manager. In 1945 he was named assistant to the president and held that post until 1948 when he became general sales manager. He began his second assignment as assistant to the president in 1953.

Robert J. Peters

► Robert J. Peters, former sales representative and assistant to the vice-president of the New Jersey Zinc Co., New York, N. Y., died May 12 at his home in Flushing, N. Y. He had been in retirement after more than 40 years service with the company. Mr. Peters joined the company in 1910. In 1915 he was made assistant chief, Lithopone East, also acting in a consulting and advisory capacity during construction of the Lithopone plant at Depue, Ill. In 1924 he became chief of the Lithopone Department at Depue. He became a sales engineer at the main headquarters of the company in 1926.

Malcolm R. Buffington

► Malcolm R. Buffington, consultant in chemical engineering, died June 5 at East Orange General Hospital, East Orange, N. J., after a long illness. He was previously associated with Lea Fabrics, Newark, N. J., as a chemical engineer. Mr. Buffington is survived by his wife, a son, and three daughters.

Clifford A. Jones

► Clifford A. Jones, former executive of the Seiberling Rubber Co., Akron, Ohio, died June 7 in Hayward, Calif., where he had been living for the past three years. He was 76 years old. Mr. Jones was assistant sales manager of the Mechanical Goods Division of the Goodyear Tire & Rubber Co., Akron, Ohio, from 1911 to 1921. He was assistant sales manager of Seiberling's Barberton plant and in 1927 was appointed vice-president and managing director of the Toronto, Canada, plant. He had also been a vice-president of the Kemitex Products Co., a subsidiary. In 1933 he became a vice-president of the Viceroy Manufacturing Co. Ltd., West Toronto, Canada. He is survived by his wife, a stepson, and a stepdaughter.

William H. Walker

► William H. Walker, secretary of the Kelly-Springfield Tire Co., Cumberland, Md., died May 24 in his home after a long illness. He was associated with the Brown - Graves Lumber Co., Akron, Ohio, before joining Goodyear, the parent company of Kelly - Springfield. Joining Kelly-Springfield in 1937, he was elected treasurer in 1950, and secretary two years ago. He is survived by his wife and son.

J. F. Cast

► J. F. Cast, retired executive of Firestone Tire & Rubber Co., Akron, Ohio, died June 9 in West Palm Beach, Fla. He was 80 years old. Mr. Cast joined Firestone in 1910 as a manufacturer's sales representative. When he retired in 1950 he was manager of the Manufacturer's Sales Department. He is survived by his wife and two daughters.

Francis H. Peaty

► Francis H. Peaty, retired partner in H. A. Astlett & Co., New York, N. Y., importers and exporters, died June 11 in Montclair Community Hospital, Montclair, N. J., after a long illness. He was 88 years old. He had been with the company for 28 years before retiring in 1942 and was previously a partner in the Raw Products Co., New York, N. Y.

Joseph W. Childs

► Joseph W. Childs, vice-president of the United Rubber Workers since 1949 and considered the logical successor to Union President L. S. Buckmaster who will retire in September, died April 24 at City Hospital, Akron, Ohio, following a heart attack. He was 50 years old. Mr. Childs began work at the General Tire and Rubber Co., Akron, Ohio, in 1928, where he helped form Federal Labor Union 18323, which later became URW Local 9. He was a picket captain at the first sitdown strike in the rubber industry, and was elected president of the local in 1940. He served in the Akron City Council in 1942 and 1943. In 1944 he was appointed CIO member of the Cleveland Regional War Labor Board and served as an alternate to the National War Labor Board.

At the end of World War II, Mr. Childs returned to his work at General, and within a month was elected president of the local, a post he held until September, 1949, when he was elected vice-president at the URW's Toronto convention. Prior to this, he had served on the URW International Executive Board for two years. He was named to the Akron Mayor's Citizens' Finance Committee in 1949 and to the U. S. Wage Stabilization Board in 1952.

From 1949 to 1955, he was a member of the National CIO Executive Board. He traveled to Israel as one of seven AFL-CIO leaders who were guests of that nation's labor federation and was also on various committees of the AFL-CIO. He is survived by his mother, a son, and two daughters.

Hans Wyman

► Hans Wyman, president of the Pantasote Co., Passaic, N. J., and the H. O. Canfield Co., Bridgeport, Conn., died June 9 of a heart attack. He was 74 years old. A Czechoslovakian refugee who lost an industrial empire in Central Europe to the Nazis in 1939, Mr. Wyman had made a rapid success as an industrialist in the United States since his arrival in this country in 1941. Able to salvage a considerable amount of working capital, Mr. Wyman and his sons spent more than half a million dollars in gaining control of Pantasote and Canfield, and converted them into profitable enterprises. He is survived by his wife, and three sons and a daughter by his first marriage.

Photograph courtesy of Casco Products Corporation, Coated fabric by Aldan Rubber Co.

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Overseas

Yokkaichi—A 25,000-ton-a-year dehydrogenation process unit for production of butadiene, the second of three foreign units of its kind licensed by Houdry Process Corp., Philadelphia, Penna., has been placed on stream by the Japan Synthetic Rubber Co., Ltd. The Japanese facility is part of an integrated synthetic rubber plant with an annual capacity of 45,000 metric tons of butadiene-styrene rubber.

Londonderry—Production of neoprene synthetic rubber for the United Kingdom and other European markets has started at the Maydown Works of the DuPont Co., (United Kingdom) Ltd., which is located in Northern Ireland. The Maydown Works is the second manufacturing facility to be put in operation by DuPont's European subsidiary companies in the past six months.

Tel Aviv—The Alliance tire factory in Israel will increase its production from 7,500 to 12,500 tons a year with the completion of an extension project within a year or so.

Paris—N.V. Rubberfabriek Vredestien, said to be the biggest manufacturer of tires and rubber flooring in The Netherlands, has established a subsidiary in Paris, France. The subsidiary, called S.A. Vredestien, France, has built up a growing market in France for its products.

London—Shell Chemical Co., Ltd., London, England, plans to build a plant at Carrington, England, for the production of polybutadiene and polyisoprene. The plant, scheduled to be on stream during 1963, will utilize an application of the Ziegler and Natta processes to synthetic rubber.

Kralupy—The third Five-Year Plan of Czechoslovakia calls for the construction of a butadiene-styrene rubber plant at Kralupy. The plan covers the period of 1961-1965, and has scheduled completion of the rubber plant for 1963.

Capetown—The Union of South Africa is considering the establishment of a $14 million synthetic rubber plant. According to reports, the proposed plant will produce the presently consumed 16,000 tons of imported synthetic rubber annually. Even more than this productive capacity will eventually be required to replace the additional 24,000 tons of imported natural rubber, the supply of which is said to be falling further behind demand each year.

Campinas—B. F. Goodrich do Brasil, a wholly-owned subsidiary of B. F. Goodrich Co., Akron, Ohio, dedicated its new tire manufacturing plant in Campinas, Brazil.

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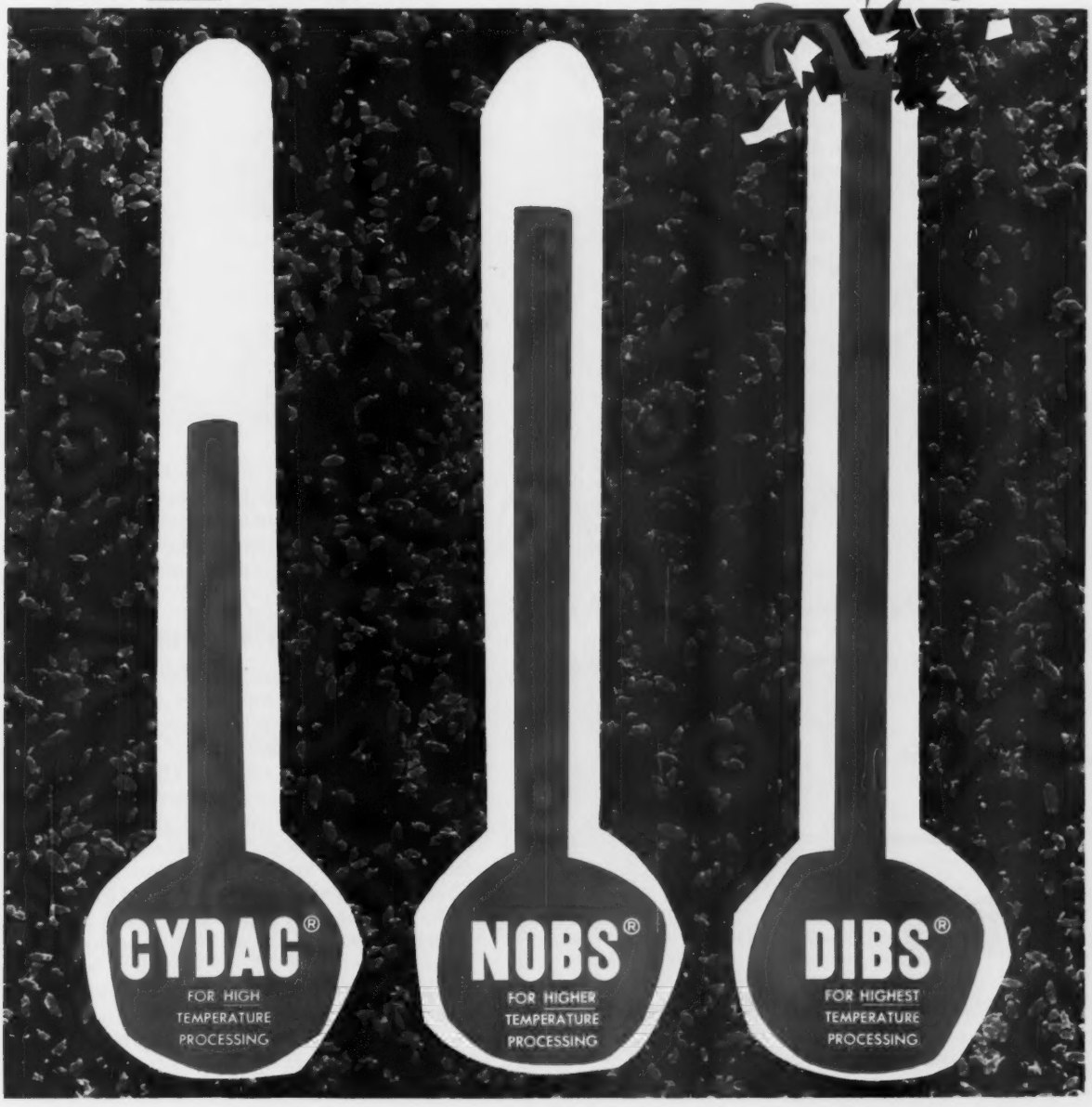

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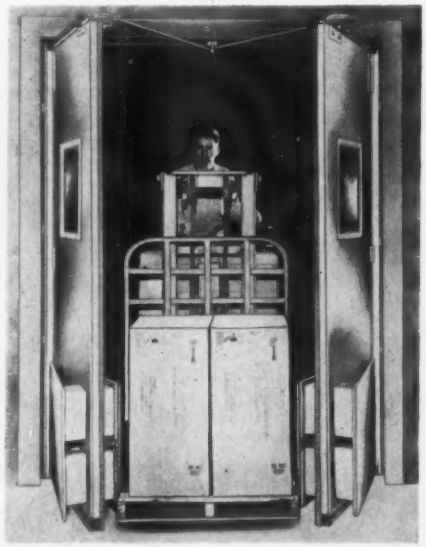
Shock-Absorber Door

► The Clark Door Co., Newark, N. J., has developed a shock-absorber door which utilizes flexible urethane foam as a cushioning material to withstand the constant poundings caused by in-plant trucks and dollies. Nopcofoam, a urethane foam said by its manufacturer, Nopco Chemical



Co., North Arlington, N. J., to be impervious to oils and greases, is used as a buffer between the actual door surface and the shock absorber panel. The material is also reported to be fire resistant and rotproof, fungus and mildew proof.

Insulated Combat Boot

► A white, insulated, rubber combat boot has been developed for use of troops in arctic temperatures by the Quartermaster Research and Engineering Command, Natick, Mass., and the B. F. Goodrich Co., Akron, Ohio. The boots are designed for use in dry-cold regions where temperatures range from 14 degrees above zero to 65 below, although they have been tested in temperatures as low as 102 degrees below zero. The vapor barrier principle is used in sealing three layers of wool fleece in the upper, and two layers of felt in the midsole between inner and outer rubber layers. The seal prevents sweat and outside moisture from wetting the fleece and destroying the insulation. Each boot has a self-closing air-release valve for equalizing air pressure that may build up inside the boot's insulation.

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Unbreakable Flower Pot

► Schacht Rubber Manufacturing Co., Huntington, Ind., is producing an unbreakable flower pot made of Goodyear Plioflex synthetic rubber. The

pots, which bounce when dropped, come in red, yellow, green, turquoise and pink, and do not fade or peel.

Latex Carpet Backing

► A self-curing latex compound for carpet backing that has exceptional heat and light-aging characteristics is being manufactured by the Naugatuck Chemical Div., U. S. Rubber Co., Naugatuck, Conn. The new material, Lotol-4634, is cured merely by drying. Absence of the usual sulfur curing agents and accelerators improves odor, heat and light discoloration qualities, the company reports. Prolonged tests of the new material in a Fadeometer showed practically none of the usual discoloration from heat and light exposure. In most applications, there is no need to add plastic latices or hard resin extenders to improve hand. With ordinary fillers the compound can give high-strength, full bodied hand, exhibiting good resilience and resistance to deformation, the company states.

Baby Bottle Keeper

► Insul-Foam Baby Bottle Formula Keeper is a molded plastic container made by the Townsend Company, Ft. Lauderdale, Fla., and will keep one bottle of formula or two jars of baby food either hot or cold for up to five hours. Molded of Dylite expandable polystyrene, a product of the Plastics Division, Kopper Co., Inc., the keeper is usually cleaned with soap or detergent and warm water, and the plastic, which is shock absorbent, protects the contents from breakage. The container comes in a pink and white mottled effect with pink trim.

Gallery of rare species from the Polymer Age

Cross sections of extrusions courtesy Bowling Green Rubber Company, Paris, Tenn.

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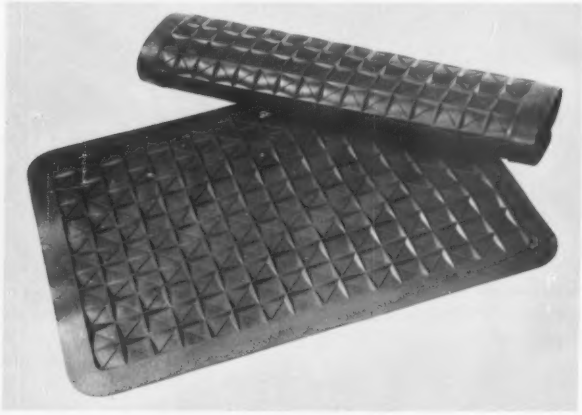

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Viton Flexible Hose

► Thermoid Division, H. K. Porter Co., Inc., Philadelphia, Penna., has developed a new flexible hose which, according to reports, can be used for short periods at temperatures up to 600°F., lasts almost indefinitely at 350°F., and resists extremes of chemical attack. Because of its construction with DuPont's "Viton", the hose can be used under conditions for which no previous hose of natural or synthetic rubber or plastic was suitable, the company states. In addition, high strength and resistance to abrasion is contributed by a jacket of Dacron polyester fiber. Thermoid claims that the new hose can be used with jet fuels over a wide range of temperatures, highly aromatic mixtures such as internal combustion fuels, and petroleum-based lubricants at temperatures as high as 400°F. It is reported to resist penetration by tetraethyl lead compounds used in aviation and motor gasoline, and has exceptional resistance to such solvents as carbon tetrachloride, benzene, toluene and xylene, as well as to concentrated acids and bases. The hose is available in one to four inch interior diameter sizes, with or without couplings.

Wide Vinyl Flooring

► A new all-vinyl compounded line of six-foot wide roll goods, said to be the first in the flooring industry, is being introduced to the market in 1960 by Goodyear Tire & Rubber Co., Akron, Ohio. The Superba line, being manufactured in terrazzo and metallic finishes, is designed to virtually eliminate installation seams. Produced for residential applications, the flooring will cover large rooms with only one or two seams, reducing dirt-catching cracks for better protective maintenance and adding to the decor by permitting larger areas of uninterrupted pattern flow. Superba will be in the retail price range of linoleum and will consist initially of eight, light decorator colors, featuring metallic overtones the company states. Colors include beige, gray, green, and blue.

Dacron Woven Hose

► Eureka Fire Hose Division, U. S. Rubber Co., 1230 Avenue of the Americas, New York, N. Y., is offering both its exclusive construction multiple-woven hose and its double jacketed line in 100 per cent Dacron construction. Both lines come in diameters from 1½ to 6 inches, in lengths of 50, 75 and 100 feet, and are reported to be able to withstand pressures up to 600 psi. The double jacketed hose is marketed under the name Super Safety, and the multiple-woven hose is called Super Paragon. According to the manufacturer, the advantages of Dacron construction are its resistance to abrasion and chemicals, lightness in weight, flexibility, and tensile strength.

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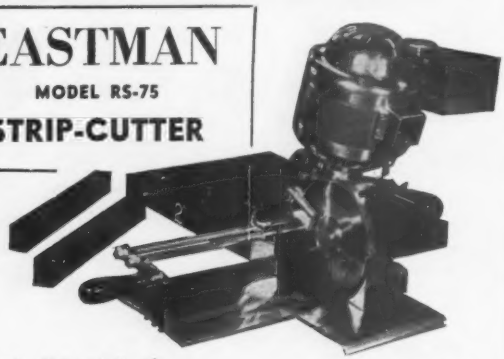

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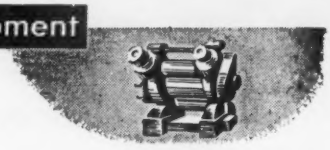
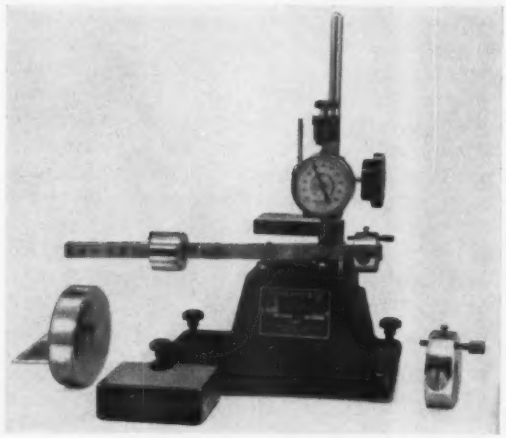


Durometer Calibrator

► The Durocalibrater, manufactured by Shore Instrument & Mfg. Co., Inc., 90-35 Van Wyck Expressway, Jamaica, N. Y., is designed for field use in testing and calibrating Shore Durometer rubber hardness testers. The manufacturer reports that the device is a highly accurate and ruggedly constructed beam scale enabling durometer



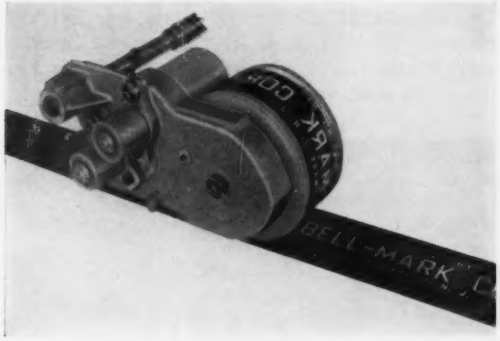
users to verify accuracy and to calibrate these instruments in their own plants. The Durocalibrater may be used for calibrating any quadrant style Shore A Durometer or round style Shore A-2 Durometer conforming to the current ASTM designation D676. The unit may also be used for calibrating other durometers, such as quadrant style durometer types B, O and T, and round style types B-2, O-2 and T-2. The Durocalibrater enables its users to keep periodic checks on their durometers over the entire scale and allows for recalibration with a maximum of ease, the manufacturer states.

Temperature Controller

► Model 535, the third in a series of Unit Thermistory Controllers manufactured by Fenwal Inc., Ashland, Mass., is a temperature controller designed for single point control covering a range of from 0° to 600° F. Thermistor sensing elements may be mounted hundreds of feet from the controller itself, and connections may be uncompensated standard electric wiring. The unit, surface mounted with screws or bolts, contains a transistor amplifier, a dial for temperature control point adjustment, and a relay to apply power to heaters, alarms, or other external loads.

Automatic Rubber Imprinter

► Bell-Mark Corp., 18 Ropes Place, Newark, N. J., has developed an automatic imprinter for the rubber industry that imprints a sharp, indelible impression that permits product identification throughout the entire rubber processing cycle. Easily installed on production machinery from which it derives its power, the imprinter, designated Model 3073, is usually placed at a point



where the crude rubber is extruded from the tuber. A conveyor carries the rubber under the Bell-Mark printer. Friction driven, Model 3073 imprints the hot stock before it is immersed in the water bath. Designed for use in virtually any type of rubber processing arrangement, the unit has all rollers adjustably mounted on ball bearings and gear connected to assure constant, positive traction between surfaces. The printing roller can be fitted with adhesive-backed rubber printing plates mounted on sleeves or brass strips. Special attachments are available for imprinting ply stock or for other specialized rubber applications. The unit features a positive locking device that secures brass-backed printing plates, has a large ink fountain and reservoir, and includes a newly-engineering form roller that permits a uniform distribution of ink.

Curometer Testing Instrument

► A new instrument which quickly records the cure characteristics of rubber, the Wallace-Shawbury Curometer, is reported to be fully automatic once the specimen is inserted and to require no attention or timing during the test. Manufactured by Testing Machines, Inc., Mineola, N. Y., its test is said to be equivalent to the 300 per cent tensile modulus in the estimation of the degree of cure. The instrument, which records its results on chart paper, can also be used to measure scorch time at any degree of temperature. The Curometer was developed by the Research Association of British Rubber Manufacturers in conjunction with H. W. Wallace Co.

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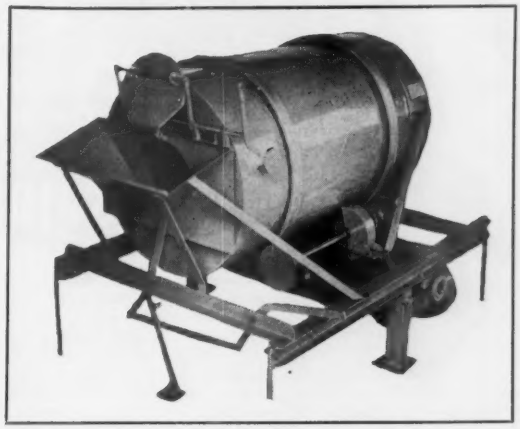

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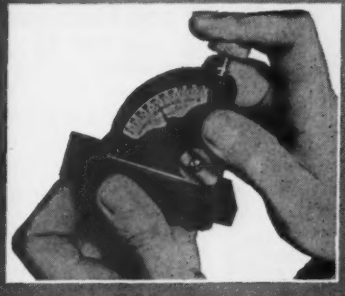

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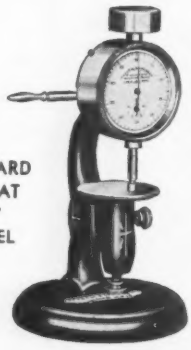

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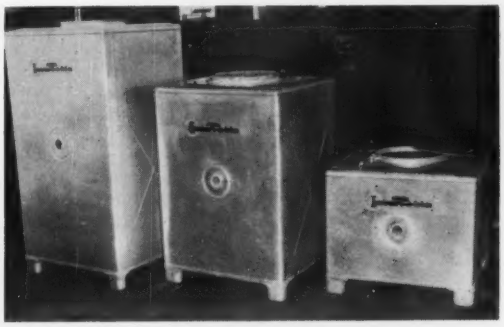

the four side walls conforms closely to the normal angle of repose of most commodities. When inverted, this cone provides assurance and ease of complete unloading, the manufacturer reports. Commodities which tend to pack and densify in transit and storage are returned to the flowable stage as the container is inverted just prior to unloading. According to the manufacturer, one grab and rotating attachment on a standard lift truck, one sling type inverter with monorail or crane, or one floor type inverter and fork truck can service any number of use-points.

Shaft Revolution Counter

► A new, miniaturized, shaft-driven revolution counter has been introduced by Automatic Timing & Controls, Inc., King of Prussia, Penna. The device counts shaft revolutions up to 1,000 r.p.m. and requires only 1¼ ounce-inch torque for dependable electrical control of a machine or system operation. Repeatability is ±0.0025 of dial range. Applications of the counter include winding, to a predetermined length, coils, spools, armatures with wire, cables, or synthetic materials. The counter also functions as an automatic control for cutting such materials to specified lengths. It has an electrically operated clutch which connects input rotation to the traveling dial pointer. A totally-enclosed gear train reduces the number of input shaft revolutions to a single turn representing the full scale of the dial.

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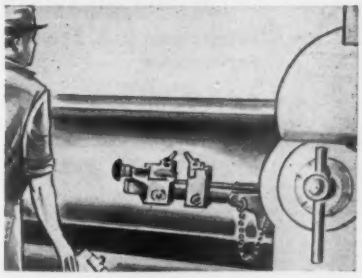

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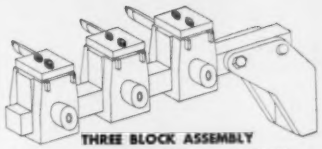

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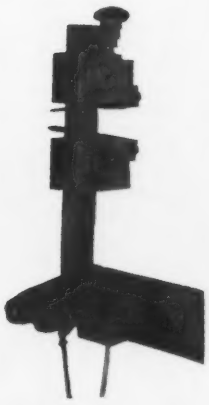
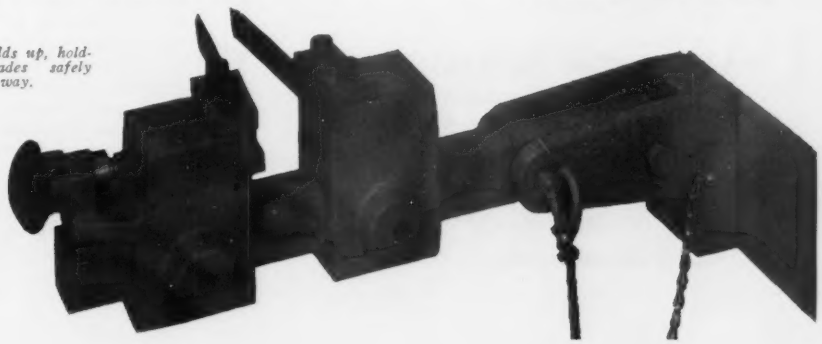


Unit folds up, holding blades safely out of way.



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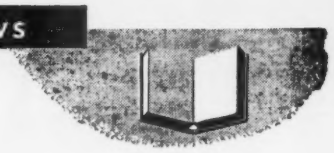
Reviews



Encyclopédie Technologique de l'Industrie du Caoutchouc. (Technological Encyclopedia of the Rubber Industry). Published by S. R. L. Dunod, 92 Rue Bonaparte, Paris (6), France. 6 x 9½ in. Four volumes, listed separately below; fifth to be published at a later date.

More than twenty years have passed since the last edition of the French Rubber Technology Encyclopedia (Encyclopédie Technologique du Caoutchouc) assembled the limited data then available on latex processing and recognized the advent of commercially significant, synthetic elastomers. At that time, two volumes and 1,400 pages sufficed to record the established facts on technological progress in natural rubber production, properties, compounding and products. Beyond a prophetic introduction and a handful of references, the new synthetics had not attained the degree of authenticated performance that French editors require of material for an encyclopedia.

The two decades between editions have witnessed tremendous achievements in the entire industry. Furthermore, in the four volumes which have already appeared in the present set, with one more on deck, synthetics are given an equal place in the limelight as a sign that they have "arrived" even by encyclopedist standards. It must be a historic event for one of the co-editors, Georges Genin, who directed both editions, to preside over this scientific revolution. Together with his colleague, B. Morrison, likewise an engineer of long and respected standing, Monsieur Genin has marshalled a staff of international experts to contribute articles on the chemistry, physics and processing of virtually the entire elastomer family, synthetic as well as natural. The result is certain to become a classic in its field.

Vol. I. Production of Natural Rubber. Manufacture of Artificial Rubbers. 658 pp. $13.00.

This initial volume establishes the comprehensive yet practically oriented approach of the entire series. While some topics of special interest to basic research are presented in fairly summary fashion, the stress is clearly on technology and industrial application. Most of the authors are French authorities on their specialized subjects, but German, Dutch, English and American specialists are also represented—particularly in the chapters that deal with the production of synthetics. Space devoted to the latter is actually 70 pages more than that given over to natural rubber production.

Each of the two sections composing the book is under the editorial supervision of a well-qualified expert —J. LeBras and H. Guinot for natural and synthetic, respectively—in addition to guidance from the chief editors for the entire set, plus a distinguished advisory board of "elder statesmen" representing the industry. Individual chapters are written concisely, without excessive footnotes or tabular material, tailored to the interests of suppliers, manufacturers, distributors, engineers, students, and persons engaged in applied research. Part One devotes 11 chapters to the various stages of the natural product—from the cultivation of Hevea to the design of finished goods—covering much useful data on storage and concentration of latex. The second section begins with an excellent thumbnail sketch of polymerization theory by Professor Mark of Brooklyn Polytechnic, followed by a survey of nine major synthetics, discussing properties of latices and vulcanizates: butadiene (petroleum, alcohol and acetylene derivations), isoprene, piperylene, styrene, buna, neoprene, butyl and the thioplasts.

Vol. II. Physical and Chemical Properties of Natural and Synthetic Rubbers. Recipes and Preparation of Compounds. Major Related Materials. 784 pp. $19.20.

It is in this volume, perhaps more than anywhere else in the opus, that the inherent limitations of any encyclopedia for a field of ever expanding technology become apparent. The difficulty seems to stem from the incompatibility of the two major aims which guided the directors of this editorial project. First of all, they attempted to create a comprehensive reference work for the practicing rubber engineer and executive, stressing proven materials and methods with minimal resort to the theoretical and speculative aspects of research. Their other objective was that of any "encyclopedist" who tries to create a permanent record of the high-water marks in his area. A compendium on as fluctuating a subject as rubber development, however, it could be argued, serves more to crystallize than to spread the news. In short, putting current knowledge on "the state of the art" between hard covers is not likely to produce an up-to-date handbook.

Indeed, much of the data in this part on properties of elastomers, fibers and coloring agents—especially as it touches upon or omits mention of the latest synthetics—is of greater historical than practical significance. This becomes further apparent when one checks the recency of bibliographic references, to find them generally ending with papers published in the early Fifties. As far as they go, there is no gainsaying their definitive descriptions and evaluations. The endorsement applies equally to Section One on rubber chemistry and physics; Section Two on compounding; as well as to the last section about "related materials"—textiles, dyes and solvents.

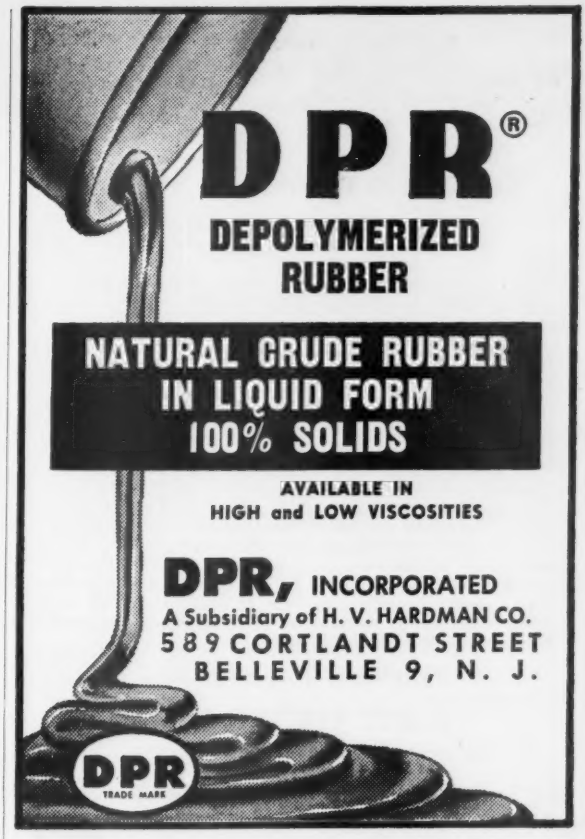
Vol. III. Rubber Technology. Various Applications. 614 pp. $12.00.

The manufacture of specific products, comprising what we would term mechanical rubber goods, plus various and sundry items (footwear, wires and cables, stationery, sporting goods, flooring, etc.), is treated in this volume in a way that presents a good opportunity to point out the seemingly obvious: the entire series is French, in orientation as well as in language. The American reader should be apprised of this central fact. Here, for example, he will find 24 chapters written by French specialists with the sole exception of two Belgian co-authors. While there are many parallels to U. S. products, direct comparisons cannot be expected.

Most of the contributors to this installment come from the ranks of working engineers; therefore, they draw heavily on their laboratory and production line experience. Schematic drawings and photographs, mostly from catalogs and company files, are used judiciously to illustrate the construction of specific goods. The chapters naturally vary in level and extensiveness of discussion: from 8 pages on erasers to 68 on footwear. Tucked away among the technical papers one finds a provocative essay by Paul J. H. Loeffler, proposing a classification system for "cellular rubbers." His terminological code, based on size and structure of cells in spongy-type elastomers, is just one of the numerous features which commend this part of a consistently lively work to rubber specialists throughout the world.

Vol. IV. Tires, Tubes and Solid Tires. Primary Uses of Latex. 587 pp. $12.00.

Pending issuance of the fifth and final tome which, we trust, will contain a subject index for the entire encyclopedia, this review of latex applications and tires represents the briefest volume of the series. From raw materials to recapping in 160 pages, the section on tires can offer merely a bird's-eye view of that topic as it



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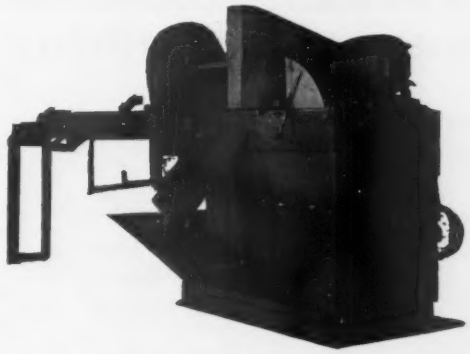

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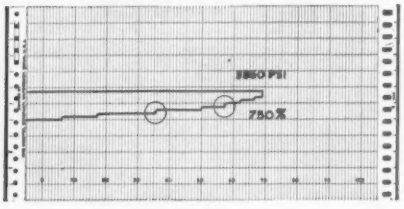

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was up to 1952. There is still enough in it of continuing interest today, however; a chapter on metallic carcasses and pneumatic railway tires, for one.

The second part deals with latex in a more extensive fashion, although it is of necessity as dated as other passages where editorial deadlines could not keep up with the pace of a kind of research applied in short order to produce improvements and innovations. The crucial time lag between a laboratory development and its appearance in print emphasizes the vital role played by technical journals, conference proceedings and direct communications as the channels where most effective "cross-fertilization" of ideas can transpire. Regarding the chapters devoted to latex in particular, we find an undoubtedly handy reference section: from formulating to testing, stopping en route for a glance at molding, sponge, fibers, adhesives, insulation and a host of other highlights.

At this point a special note of appreciation is due to all responsible for writing and compiling the nearly 3,000 pages that have appeared so far—for their remarkable scope and thoroughness, not to mention merely patience. The final set, when it reaches the shelves of libraries, laboratories and industrial offices, should stimulate as well as inform the specialist who wants to find out where he stands technologically, how he got there and whither avenues of progress are likely to lead him.

BOOKLETS, CATALOGS, etc.

V-Belt Drives and Industrial Hose. (Catalog 260). Dayton Industrial Products Co., Melrose Park, Ill. 8½ x 11 in. 50 pp.

This catalog covers Dayton Industrial's line of V-Belts, including Cog-Belt and Poly-V and fractional types, with data on sizes, dimensions and prices. A special section on hose lists information about the company's line of molded braided, horizontal braided, machine-built wrapped fabric, hand-built wrapped fabric and woven jacket hose. Data also covers recommended hose applications in specific fields, such as dairy, petroleum, construction and dredging.

•

Engineering Guide to the Forms, Properties and Applications for Dow Corning Silicones. (1-115). Dow Corning Corp., Midland, Mich. 8½ x 11 in. 16 pp.

This summary of the forms, properties and applications of Dow Corning silicones is illustrated with photographs, tables and graphs. The table of contents is arranged according to applications, enabling easy reference to silicone materials that resist the effects of time, heat, moisture, weathering, oxidation, and chemical attack. Pre-addressed business reply postcards are bound into the guide to facilitate reader inquiries for more specific data.

•

How to Build Profits by Controlling Costs. Business Publications Division, Dun & Bradstreet, Inc., P.O. Box 803, Church Street Station, New York 8, N.Y. 6 x 9 in. 48 pp.

Written from the point of view of the small businessman, this booklet deals with the problem of cost control. The first part of the booklet uses the case history approach to common business problems experienced by a typical small business owner. It includes many suggestions for controlling costs. In the second part there is a step-by-step examination of record keeping, analysis of figures, and the use of ratios as a means of comparing performance.

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (June 1), the price of natural rubber on the New York Commodity Exchange has moved in the range of 350 points, high for the period being 47.50c reached on June 27, and low for the period being 44.00c reached on June 7. The average price of spot rubber for June was 45.70c based on 22 trading days.

The sluggishness displayed during the closing days of June on the New York market, especially as it brought futures to new lows for the current cycle, reflected a drift in the Singapore position. The mixture of uncertainty and declining prices in Malaya came in the face of lagging demand from Russia and Red China, while stocks continued to build up. The depressive effect made itself felt most noticeably on the London exchange, where no signs of a rally could be discerned and Continental demand was reportedly at a minimum.

If bearish sentiments were prevalent along this economic pipeline, with net losses for the month amounting from 25 to 135 points in New York futures, there were some silver linings in the Southeast Asian clouds. A minor rally was noted in Singapore, generally attributed to news that a Soviet steamer is due in July to load rubber. Even more significantly, English and U. S. markets continued to feel the acute shortage of awarded or certified No. 1 RSS, this scarcity of near rubber in turn propelling the N. Y. spot market along its long-range upward course.

Stockpile Sales To Be Competitive

Another major factor on the domestic front was furnished by the General Services Administration announcement on June 23 that bareback ribbed smoked sheets from the stockpile would be offered at market prices, less an allowance of ⅜c per lb. to compensate for age, handling, thawing and other extra costs involved in processing the government-stocked material. This move, the official announcement explained, was designed to make its stored product competitive with freshly produced, imported stock.

The GSA also disclosed that about 70,000 long tons of rubber have been sold so far under the Congressionally approved nine-year program, leaving another 400,000 to be disposed of: approximately 200,000 tons of No. 3 RSS, 100,000 of No. 2 RSS, 70,000 of No. 1 RSS, and 30,000 of pale latex crepe rubber. According to the sliding scale adopted earlier this year, unlimited amounts will be offered as long as the market exceeds 36c, while sales will be suspended when it falls below 30c.

As clearly as this policy was spelled out, consumer reaction still took a wait-and-see stance. June auto production, pegged at 616,300 units, rose about 1 per cent above May and 10 over June, 1959—one more bright spot on the gray horizon.

NEW YORK, JULY 1, 1960

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM JUNE 1 TO JUNE 30

June	Spot	July	Sept.	Nov.	Sales
1	44.25	42.50	41.13	40.10	24
2	44.25	42.75	41.25	40.25	27
3	44.25	42.92	41.25	40.37	22
4	....	....	....	....	..
5	....	....	....	....	..
6	44.75	43.70	41.60	40.55	63
7	44.00	42.75	40.85	39.75	70
8	44.25	42.75	40.80	39.80	73
9	44.25	42.80	40.90	40.00	17
10	44.50	43.10	41.10	40.10	15
11	....	....	....	....	..
12	....	....	....	....	..
13	44.50	43.65	41.40	40.25	10
14	46.00	44.80	42.05	41.00	159
15	46.50	46.00	42.10	41.00	87
16	47.00	45.50	41.85	40.60	50
17	46.50	45.40	41.95	40.60	28
18	....	....	....	....	..
19	....	....	....	....	..
20	46.25	44.82	41.45	40.25	63
21	46.25	44.90	41.45	40.10	32
22	46.50	45.40	41.65	40.40	76
23	47.50	45.95	41.65	40.40	75
24	47.25	45.80	41.30	40.10	53
25	....	....	....	....	..
26	....	....	....	....	..
27	47.50	46.40	41.53	40.15	25
28	47.00	45.66	40.57	39.25	26
29	46.25	44.85	40.30	39.05	99
30	46.00	44.55	40.25	38.90	114

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.46
July	.43¼
Aug.	.41½
Thin Latex Crepe:	
Spot	.48
Thin Brown Crepe, No. 2	.39
Flat Bark Crepe	.31¾

London Market
(Standard Smoked Sheets)

Aug.	40.35 — 40.50
Oct.-Dec.	39.33 — 39.47

Singapore Market
(Standard Smoked Sheets)

Aug.	38.93 — 38.97

Middling Upland Quotations

	May 31	June 30		
	Close	High	Low	Close
July	32.77	32.88	38.25	32.88
Oct.	31.00	31.09	31.07	31.07
Dec.	31.06	31.19	31.18	31.18

Notes & Quotes

American industry was urged by a rubber executive to "go global" if it expects to offset foreign competition, maintain world economic leadership and continue its long-range growth. H. E. Humphreys Jr., chairman of U. S. Rubber, told the Manufacturing Chemists' Association meeting in White Sulphur Springs, West Va.: "We must resist more vigorously any wage increases that outstrip increased productivity and thereby increase the gap between our costs and those of other nations.

Synthetic Rubber

Consumption figures for May, just made available by the Rubber Manufacturers Association, showed the synthetic sector doing better than ever. It accounted for a new high ratio of 68.93 per cent, 0.7 above the last record for total new consumption set in April. Consumption of all types of synthetic rubber totaled 91,865 long tons for the month.

Production was also rising, with 126,689 long tons turned out in May, about 6,000 more tons of synthetic rubber than produced the preceding month. One executive saw this upward climb pointing to a U. S. consumption level of 1.12 million long tons, which would make it the highest synthetic year yet. J. W. Keener, president of B. F. Goodrich, also predicted a decline in usage of the natural product by about 2 per cent, because of its currently inflated price.

Mr. Keener was going out on a limb with an optimistic situation in his own bailiwick, specifically as it bore on the increasing success of its passenger tire stock. Improved quality of that product strengthed his conviction that, this year, synthetic's share of new consumption would reach a remarkable 67.4 per cent in the U. S.

Technological Breakthrough

Meanwhile, a Firestone laboratory director, was telling delegates at a Highway Transportation Congress in Washington, that progress would be unlimited during this decade, as new materials and advanced technology led the rubber industry to unheard of performances. Dr. J. N. Street, the research head whose address opened the meeting, pointed to new polymerization techniques as the most significant breakthrough in modern rubber chemistry.

Two products developed by his company, he said, effectively made the country independent of foreign rubber sources in the event of war. These materials, now being extensively road tested, were: Coral, a man-made equivalent to natural rubber with truck and military use potential; and Diene, a rubber extender that can be blended with either natural or synthetic to cut down on rolling resistance and power loss in tires more than had been possible with previous compounds.

At this writing, there is little doubt that the man-made material, selling for 23 cents a lb., is going to give the tree product, which is twice as expensive during this "tight" period in the spot market, a race for the money. At least one segment of the industry already has switched over almost entirely to synthetics. Foam producers made this move from their former half natural and half synthetic mixtures, largely motivated by the 20-cent price differential in favor of the new, high-quality man-made compounds.

The Case of the
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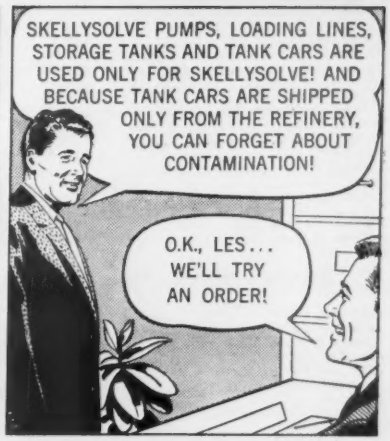
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Butaprene NXM	.5800
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Chemigum N3NS and N5	.5800
Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
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Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
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Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.6300
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1605	.1900
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
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Ameripol 4652	.1425
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Ameripol 4655	.1820
Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4700	.1750
Ameripol 4750	.1545
Ameripol 4751	.1400
Ameripol 4752	.1600
Ameripol 4753	.1480
Ameripol 4760	.1576
Ameripol 4759	.1600
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
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ASRC 1713	.1750
TSRC 3105 and 3106	.2410
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Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
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Carbomix 3750	.1820
Carbomix 3751	.1545
Carbomix 3752	.1845
Carbomix 3753	.1640
Carbomix 3756	.1569
Carbomix 3757	.1480
Carbomix 3758	.1545
Carbomix 3760	.1496
CB-102 (Shell)	.1850
Copo 1006	.2410
Copo 1500	.2410
Copo 1502	.2410
Copo 1505-NS	.2610
Copo 1507	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
Copo 1773	.2060
Copo 1778	.1910
Copo 2000	.2775
Copo 3700	.1725
Copo 3701	.1750
Copo 3900	.2310
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500	.2410
FR-S 1502	.2410
FR-S 1703	.2060
FR-S 1710	.1885
FR-S 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.2950
Naugapol 1023	.3150
Naugapol 1503	.2625
Naugapol 1504	.0330
Naugapol 6003	.2700
Naugapol 6100	.3100
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1001	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
Plioflex 1510	.2410
Plioflex 1710C and 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S and S-50	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2300
S-1002	.2325
S-1006	.2300
S-1009	.2400
S-1011	.2325
S-1013	.2300
S-1500	.2300
S-1502	.2300
S-1509	.2300
S-1600	.1825
S-1602	.1825
S-1604	.1825
S-1605	.1800
S-1606	.1750
S-1607	.1750
S-1703	.1950
S-1707	.1800
S-1709	.1775
S-1710	.1775
S-1712	.1775
S-1778	.1800
S-1800	.1475
S-1802	.1410
S-1803	.1650
S-1804	.1750
S-1806	.1510
S-1807	.1540
S-1808	.1420
S-7652	.1875
S-7701	.1850
SP-103 (Shell)	.2900
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.4700
Hypalon 30	.6000
Hypalon 40	.5000

Fluoroelastomers

Kel-F Fluorel	$15.00
Kel-F 3700 and 5500	$16.00
Vitron A and A-HV	$10.00
Viton B	$13.00

Neoprene

(prices l.c.l.)

Neoprene Types AC and CG	.5500
Neoprene Type AD	.5500
Neoprene Type FB	.6500
Neoprene Type GN	.4100
Neoprene Type GN-A	.4100
Neoprene Type GRT	.4200
Neoprene Type KNR	.7500
Neoprene Type S	.4200
Neoprene Type W	.3900
Neoprene Type WB	.4100
Neoprene Type WHV	.3900
Neoprene Type WRT	.4500
Neoprene Type WX	.4100

SYNTHETIC RUBBER POLYMERS

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000 ¹
Thiokol Type FA	.6900 ¹
Thiokol Type ST	1.2500 ¹

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 ¹
GE Silicone Gum (not compounded)	4.00 ¹
Silastic (compounded)	2.50 ¹
Silastic (gums)	4.00 ¹
Union Carbide (gums)	4.00 ¹
Union Carbide (compounds)	2.50 ¹

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 ¹
Butaprene N-400 and N-401	.5400 ¹
Chemigum 200	.4800 ¹
Chemigum 235	.5300 ¹
Chemigum 236	.5300 ¹
Chemigum 245	.4500 ¹
Chemigum 246	.4500 ¹
Chemigum 247	.4500 ¹
Chemigum 248	.4500 ¹
Hycar 1512	.4500 ¹
Hycar 1551	.5300 ¹
Hycar 1552	.4500 ¹
Hycar 1561	.5300 ¹
Hycar 1562	.4500 ¹
Hycar 1571	.5300 ¹
Hycar 1572	.4500 ¹
Hycar 1577	.4500 ¹
Nitrex 2612	.4500 ¹
Nitrex 2616	.5300 ¹
Nitrex 2620	.4500 ¹
Nitrex 2625	.4500 ¹
Tylac 640	.4500 ¹
Tylac 740	.4900 ¹
Tylac 840	.5300 ¹
Tylac 1640	.5400 ¹
Tylac 2241	.5300 ¹
Tylac 2430	.5000 ¹
Tylac 2570	.5300 ¹
Tylac 2830	.4500 ¹

Butadiene-Styrene Types

CL-101 (Shell)	.2800 ¹
Copo 2000	.2775 ¹
Copo 2101	.3000 ¹
Copo 2102	.3200 ¹
Copo 2105	.3200 ¹
Copo 2108	.3000 ¹
Copo 2109	.2775 ¹
Copo 2110	.3200 ¹
Copo 3852	.3000 ¹
FR-S 110	.3000 ¹
FR-S 150	.3000 ¹
FR-S 151	.2900 ¹
FR-S 174	.2950 ¹
FR-S 176	.2775 ¹
FR-S 2000	.2775 ¹
FR-S 2001	.2775 ¹
FR-S 2002	.3000 ¹
FR-S 2003	.3050 ¹
FR-S 2004	.3050 ¹
FR-S 2006	.2900 ¹
FR-S 2105	.3200 ¹
Naugatex 2000	.2775 ¹
Naugatex 2001	.2775 ¹
Naugatex 2002	.3000 ¹
Naugatex 2006	.2900 ¹
Naugatex 2105	.3200 ¹
Naugatex 2107	.3200 ¹
Naugatex 2108	.3000 ¹
Naugatex 2113	.2900 ¹
Naugatex J-8174	.3200 ¹
Naugatex J-8535	.3000 ¹
Pliolite 2000	.2775 ¹
Pliolite 2001	.2775 ¹
Pliolite 2076	.2900 ¹
Pliolite 2104	.3200 ¹
Pliolite 2105	.3200 ¹
Pliolite 2107	.3200 ¹
Pliolite 2108	.3000 ¹
S-2000 and S-2006	.2600 ¹
S-2101	.2600 ¹
S-2105	.2800 ¹
S-2108	.2900 ¹

Neoprene

Neoprene Latex 60	.4000 ¹
Neoprene Latex 571	.3700 ¹
Neoprene Latex 572	.3900 ¹
Neoprene Latex 601-A	.4000 ¹
Neoprene Latex 673	.5000 ¹
Neoprene Latex 735	.3800 ¹
Neoprene Latex 736	.3800 ¹
Neoprene Latex 842-A	.3700 ¹
Neoprene Latex 950	.4700 ¹

Polysulfide Rubbers

Thiokol Type MX	.8000 ¹
Thiokol Type WD-2	1.2500 ¹
Thiokol Type WD-6	.8000 ¹

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

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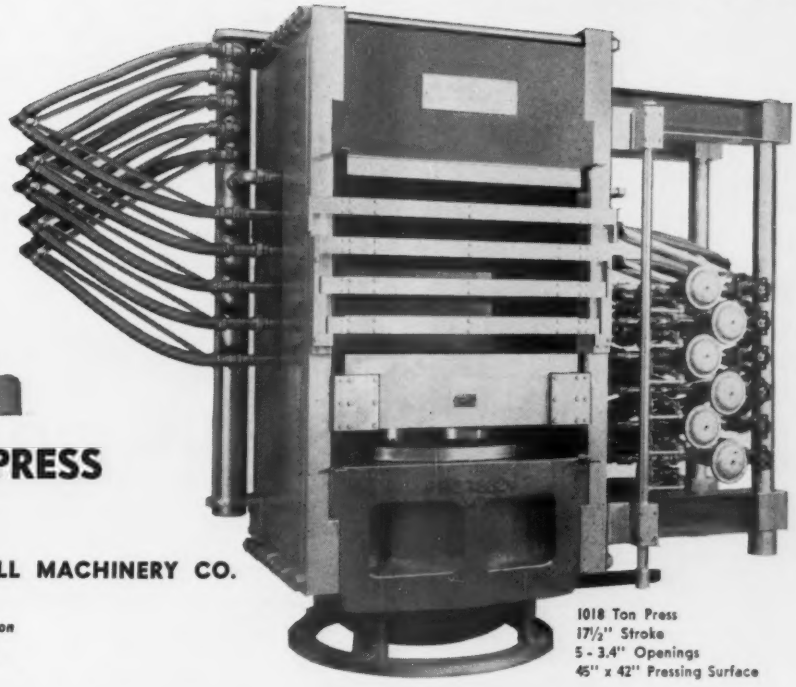

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MARKETS

(continued)

Reclaimed Rubber

Reclaimed rubber consumption for May was estimated at 23,810 long tons, as compared with the April figure of 24,210 long tons, showing a continued but mild descent in reclaimed consumption.

Industry analysts are still speculating on possibilities that high automobile inventories are holding back the reclaimed rubber market. This would seem to be one possibility, as the reclaimed rubber market hinges, of necessity, on tire manufacture. But whether this is a major factor or not will be seen more clearly as auto inventories dwindle.

However, by the end of May total stocks of reclaimed rubber had swelled slightly to 31,385 long tons, compared to the April figure of 30,916.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11¼
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Scrap rubber consumption reached 23,138 in May, giving a five months total for 1960 of 123,654. Total stocks at the end of May stood at 59,922.

Activity continues to be moderately good, unspectacular in either direction, although, up to the middle of May, special interest in the tube section was noted at both eastern and midwestern points. Mixed auto tires in the East moved at $7.00 to $12.50, the high side of the range applicable only on shipments to Buffalo. Synthetic butyl tubes continued at 8.25¢, both at Eastern and Midwestern points.

The gentle decline in consumption since the April figure of 24,517 long tons was reported, points at no definite trend, although speculations, again, are possible about seasonable buying and the effect of high auto inventories.

(Prices Delivered Akron)

Mixed tires	ton	15.00
Light colored carcass	lb.	.05½
No. 1 peelings	ton	45.00
No. 2 peelings	ton	28.00
No. 3 peelings	ton	23.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	22.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.08¼

Tire Fabrics

Tire-cord fabric imports, consisting mainly of rayon, dropped to 70,000 pounds, a further slump from the 1960 February high of 357,000. (The March figure was 125,000 pounds, marking the beginning of the current downward trend.

Meanwhile the domestic situation began to look up for U. S. rayon tire-cord producers as Detroit reports confirmed convictions that original equipment tires for almost all '61 standard passenger cars will use rayon tire cord, thus giving the lie to many in the nylon industry who believed that this year would usher in the big switch from rayon to nylon tire cording.

But there are those who continue to believe that nylon will have the final say, if not this year—an opinion seemingly borne out by DuPont's announcement that it will up production of nylon tire yarn, more than doubling nylon cord production at its Richmond, Va., plant. Nor is DuPont alone in this nylon show of confidence. DuPont figures, incidentally, claim a 40% of the market figure for nylon cord last year.

Meanwhile the battle of statistics continues with William Dalton, Tyrex president, predicting an increase of as much as 20 per cent in the use of Tyrex tire cord by 1962. Mr. Dalton made the statement while addressing an annual meeting of suppliers at the Plaza Hotel in New York City.

As the viscose tire cord industry produced 313 million pounds of viscose cord in 1959, topping the 1958 figure by 60 million pounds, and the total current market for tire cord is estimated at $300 million, it becomes apparent that now, more than ever, the squeeze is on, and, as happens in every industry, some of the "experts" will turn out to be dead wrong.

Considering the enthusiasm for nylon shown by some of the industry giants who are backing their predictions by major expansion investment, the lead still shown by rayon seems to lose a small part of its conviction.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.62½
1650	lb.	.62
2200	lb.	.62½

Nylon Tire Cord

210	lb.	1.75
840	lb.	1.47

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: Little change is apparent in the drum latex market, and the outlook for the second half of 1960 remains uncertain. Running concurrently with the not too plentiful supplies for May and June, was an apparent unwillingness to buy for the future, and a growing interest evidenced in synthetic latices. The natural latex ratio is, in fact, diminishing in the United States, as in other countries with smaller capacities. Even in Japan, a country which previously used only natural latex, buying interest in synthetic is manifesting itself on a major scale.

United States imports in April amounted to 4,935 tons, compared with 5,127 tons in March. Stocks in this country at the end of April totaled 13,896 tons against 13,964 tons at the end of March, bearing out the gentle slump in the world market from which it is, as yet, too early to draw major conclusions.

Shipments from Malaya during March totaled 10,139 tons, compared with 11,367 tons in the previous month. Some 2,025 tons were shipped to the United Kingdom, 2,302 tons to the United States, and 1,544 tons to Japan, against 2,709 tons, 1,900 tons, and 1,478 tons, respectively, in February.

Synthetic: On the whole, activity in synthetic latex remains relatively quiet, in spite of a noticeable increase in interest.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in a range of 10 points since our last report (June). High for the period was 34.25¢ reached on June 10 and remaining at this level through June 30. The low for the period was 34.15¢ maintained from June 1 through June 9. The average for the month of June was 34.22¢ based on 22 trading days. This compares with an average of 34.15¢ in the previous month based on 21 trading days.

In spite of a continued slow market in grey goods, which some believe will last through July, there is a feeling in the air that business will pick up shortly. Buyers seem to be groping for a trend despite temporary unwillingness to make major commitments.

Down in Asheville, N. C., the president-elect of the American Cotton Manufacturers Institute warned that unfair foreign competition jeopardizes the American workers' living standard. J. M. Cheatham issued the warning in his address to Southern Textile Association's 52nd annual convention. The STA pledged a fight for legislative relief if the cotton industry's latest effort, the Section 22 request for increased restrictions on imports, were turned down by the Tariff Commission—which it, indeed, was, more recently. Cheatham designated current competition as "a product of the unwillingness of the administrators of U. S. foreign trade operating policies to recognize the differences that exist in the sources of American-made and foreign-made goods."

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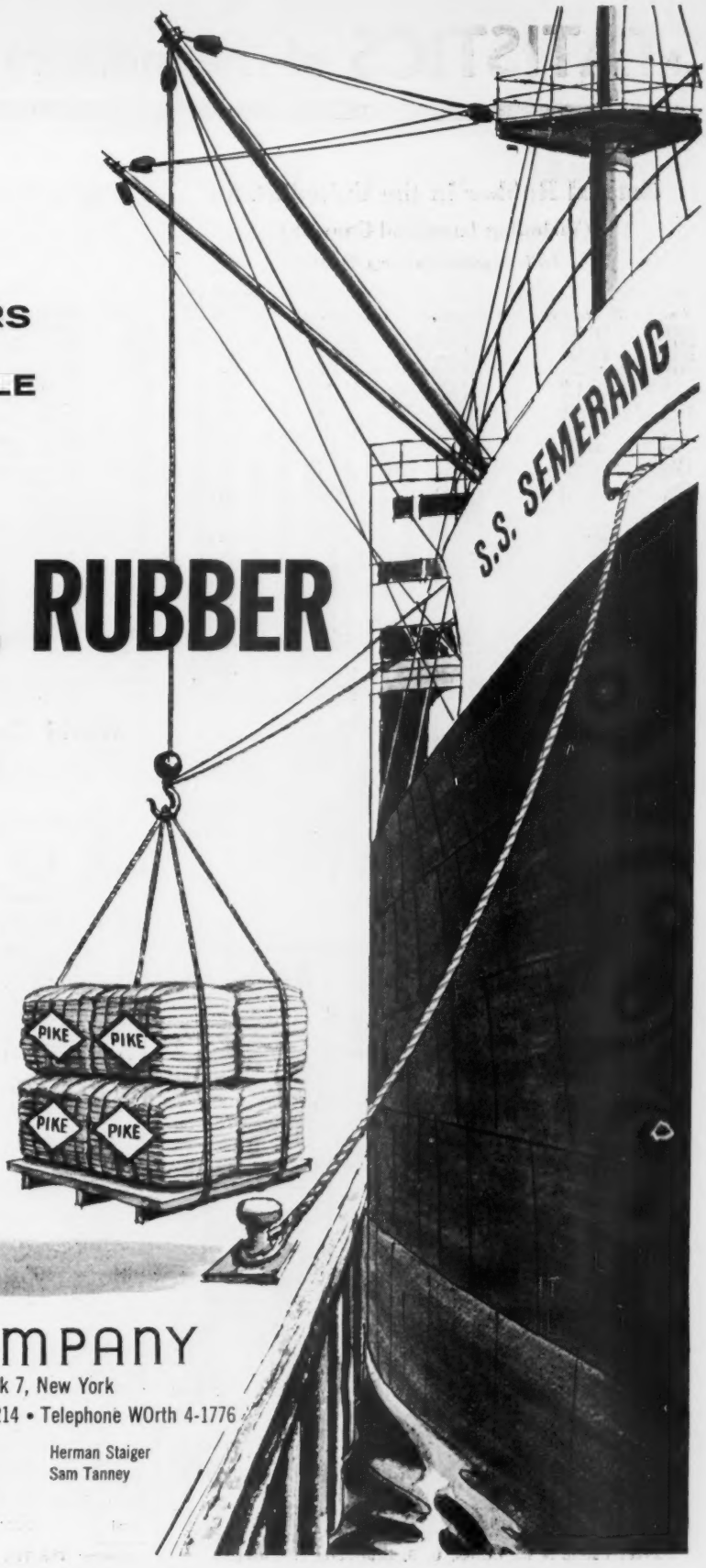

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STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	495,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1958	474,409	484,492	20,085	76,491
1959	526,048	555,044	18,750	79,405
1959:				
Oct.	48,378	49,049	1,202	74,172
Nov.	48,844	42,039	1,414	78,503
Dec.	47,444	42,950	1,139	79,405
1960:				
Jan.	43,140	46,771	1,100	76,877
Feb.	41,042	46,155	1,700	74,230
Mar.	43,707	47,205	1,522	81,599
Apr.	42,768	42,032	803	83,451

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry Long Tons	Dry Declared Value	Latex Long Tons	Latex Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1958	406,059	153,127,066	67,593	45,047,040	473,652
1959	498,749	304,594,223	79,205	60,939,662	577,954
1959:					
Oct.	41,631	31,108,534	6,747	5,612,350	48,378
Nov.	43,789	33,218,969	5,055	3,986,638	48,844
Dec.	40,739	29,686,284	6,704	6,003,513	47,443
1960:					
Jan.	29,455	22,167,388	5,340	4,690,413	34,795
Feb.	35,137	27,281,957	5,812	5,411,873	40,949

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958	663,644	614,561	100,196	103,613	26,268	446,718	1,955,000
1959	698,249	721,359	91,696	108,398	23,962	421,336	2,065,000
1959:							
Oct.	61,455	71,004	9,630	10,919	600	38,892	192,500
Nov.	59,732	62,548	9,893	13,594	600	38,633	185,000
Dec.	65,312	74,163	12,042	14,014	600	33,869	200,000
1960:							
Jan.	64,948	45,928	10,875	10,305	600	37,344	170,000
Feb.	54,544	50,274	4,285	950	600	39,347	150,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958	1,364,404	238,439	83,904	905,000	638,353	3,230,000
1959	1,626,370	259,655	101,484	985,250	689,741	3,662,500
1959:						
Nov.	125,922	22,730	9,067	94,250	63,031	315,000
Dec.	132,002	25,668	7,885	86,250	65,695	317,500
1960:						
Jan.	141,487	23,087	8,138	82,000	70,288	325,000
Feb.	139,932	22,861	8,733	.....	140,974	312,500

Source: International Rubber Study Group. * Estimated.

Rim Production

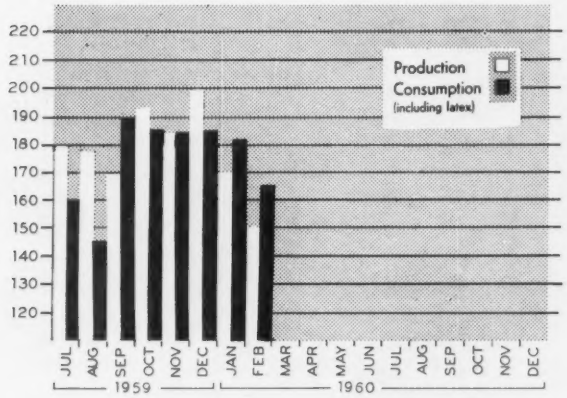
	1955	1956	1957	1958	1959
Passenger Car	38,092,080	27,109,610	27,301,567	20,665,688	25,412,177
Truck & Bus	6,642,329	6,315,428	5,468,223	3,887,910	5,019,261
Agricultural	1,931,768	1,416,938	1,368,127	1,218,240	1,386,866
Earth Mover	38,849	88,812	67,289	61,883	111,077
Total	46,705,036	34,930,788	34,205,206	25,833,721	31,929,381

	1959	1960				
	Dec.	Jan.	Feb.	Mar.	Apr.	May
Passenger Car	2,205,434	3,378,687	3,162,583	2,876,851	2,358,563	2,605,253
Truck and Bus	421,976	541,886	602,427	551,323	397,705	426,956
Agricultural	77,892	78,648	153,386	115,565	85,504	87,838
Earth Mover	8,967	8,448	8,339	9,602	12,921	10,979
Total	2,714,260	4,007,669	3,926,754	3,533,341	2,854,693	3,136,026

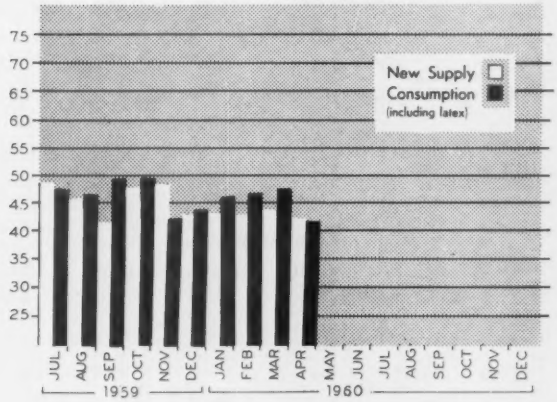
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

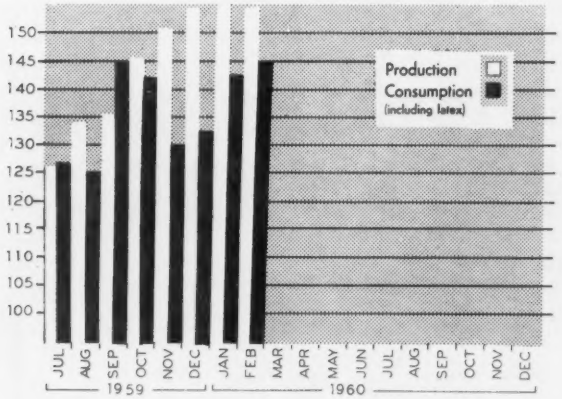
NATURAL RUBBER—WORLD
(thousands of long tons)



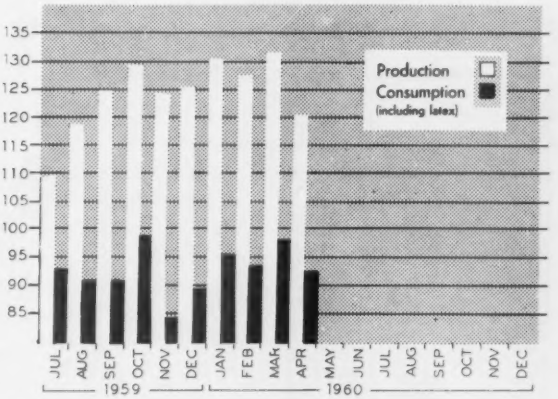
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



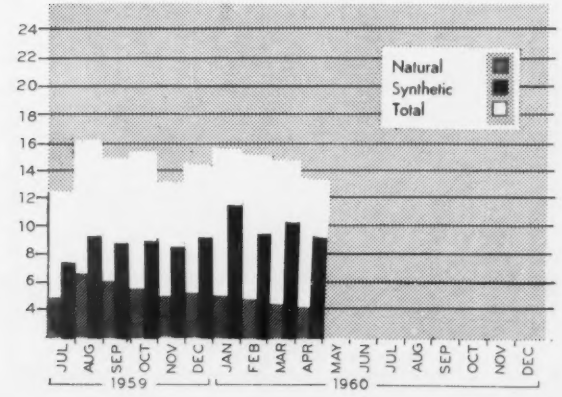
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



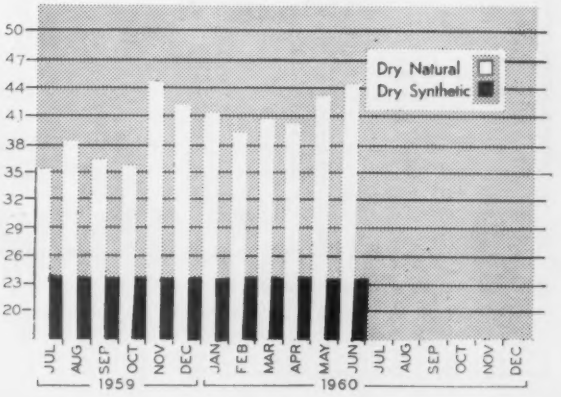
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	310,599	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1958	872,565	97,806	54,113	32,431	1,056,915
1959	1,134,379	124,815	82,704	43,588	1,385,486
1959:					
Oct.	107,120	10,099	8,223	3,864	129,306
Nov.	102,325	11,660	7,714	3,827	125,526
Dec.	102,157	11,475	8,661	3,486	125,779
1960:					
Jan.	107,519	11,958	8,325	3,808	131,610
Feb.	105,030	12,106	6,917	3,126	127,179
Mar.	110,239	11,305	7,828	3,613	132,985
Apr.	97,963	11,879	7,958	3,095	120,895

Consumption

1960	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1958	730,196	69,694	53,432	26,590	880,912
1959	886,275	84,955	65,454	34,638	1,071,322
1959:					
Sept.	79,835	7,326	6,579	3,119	90,859
Oct.	81,963	7,538	5,965	3,128	98,594
Nov.	69,217	6,684	5,327	2,655	83,883
Dec.	73,871	6,996	5,489	2,696	89,052
1960:					
Jan.	78,891	7,361	6,093	2,788	95,133
Feb.	76,999	7,369	6,070	2,765	93,203
Mar.	81,065	7,693	6,324	2,645	97,727
Apr.	75,849	6,525	5,492	2,386	90,252

Exports

1950	900	4,826	31	1,895	7,652
1951	483	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1958	142,069	31,337	13,793	6,718	193,917
1959	211,300	39,551	21,700	8,256	280,843
1959:					
Sept.	22,506	4,864	2,240	692	30,302
Oct.	13,476	2,250	1,383	679	17,788
Nov.	18,916	3,362	1,242	648	24,168
Dec.	25,392	4,662	1,265	1,031	32,350
1960:					
Jan.	21,967	4,185	2,396	527	29,075
Feb.	22,791	4,588	1,528	740	29,647
Mar.	27,081	4,874	1,803	532	34,290

Stocks

1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	115,499	11,349	19,267	4,280	150.395
1955	108,989	12,220	10,500	6,030	137.739
1956	151,763	14,077	28,744	7,934	202.518
1957	140,199	18,843	31,489	7,454	197,985
1958	143,533	15,688	18,770	7,292	185.283
1959	174,606	14,164	13,188	8,888	210,846
1959:					
Nov.	168,490	13,043	11,447	9,077	202,057
Dec.	174,606	14,164	13,188	8,888	210,846
1960:					
Jan.	183,242	15,143	14,039	9,198	221,622
Feb.	186,166	13,930	12,735	8,352	221,183
Mar.	189,308	13,491	12,764	8,175	223,738
Apr.	185,464	13,796	14,021	8,230	221,511

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1958	67,591	65,669	10,679	11,560	87,908	155,499
1959	72,502	93,303	13,127	14,034	120,464	192,966
1959:						
Sept.	6,947	8,201	956	1,364	10,521	17,468
Oct.	6,747	9,424	1,020	1,187	11,631	18,378
Nov.	5,055	8,144	1,206	1,104	10,454	15,509
Dec.	6,705	8,429	1,017	1,045	10,491	17,196
1960:						
Jan.	5,339	9,720	1,154	1,131	12,005	17,344
Feb.	5,812	9,862	1,085	1,098	12,045	17,857
Mar.	5,127	9,351	1,004	1,217	11,572	16,699
Apr.	4,935	9,408	1,137	917	11,462	16,397

Consumption[1]

1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1958	70,183	60,283	9,555	10,549	80,387	150,570
1959	71,745	80,646	11,394	13,258	105,298	177,043
1959:						
Sept.	6,342	6,919	910	1,178	9,007	15,349
Oct.	6,153	7,388	969	1,158	9,515	15,668
Nov.	4,858	6,427	893	981	8,301	13,159
Dec.	5,206	7,428	895	993	9,316	14,522
1960:						
Jan.	5,491	8,094	999	1,117	10,210	15,701
Feb.	5,463	7,838	969	1,000	9,807	15,270
Mar.	4,847	8,104	1,076	927	10,107	14,954
Apr.	4,199	7,154	913	976	9,043	13,242

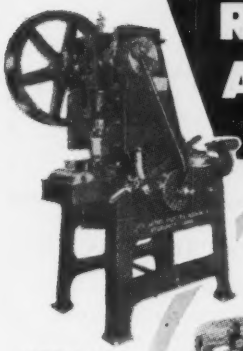
Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1958	8,900	7,672	1,663	2,519	11,854	20,754
1959	12,717	8,226	1,581	2,883	12,690	25,067
1959:						
Sept.	11,742	7,196	1,498	2,810	11,504	23,246
Oct.	12,220	7,570	1,464	2,888	11,922	24,142
Nov.	11,707	8,279	1,451	2,975	12,705	24,412
Dec.	12,717	8,228	1,581	2,883	12,690	25,067
1960:						
Jan.	12,781	7,781	1,680	2,799	12,260	25,041
Feb.	12,974	8,606	1,534	2,535	12,675	25,649
Mar.	13,964	8,055	1,518	2,492	12,065	26,029
Apr.	13,896	9,081	1,595	2,242	12,918	26,814

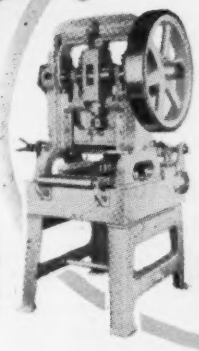
Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

CUT YOUR RUBBER... AND COST WITH A COULTER

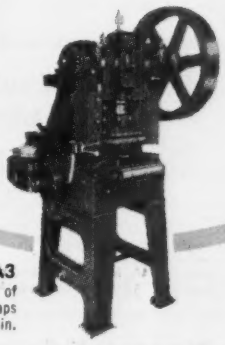
Coulter precision rubber cutting machines give you a double edge in cutting costs



MODEL A1
Precision cutting for both high speed production or short runs.



MODEL A2
Precision cutting for multiple heels, half and full soles with stock grain.



MODEL A3
Precision cutting of multiple heels and taps with or across stock grain.

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CLEVELAND 5 OHIO

Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1959 Production Workers (thousands)	1959 Average Weekly Earnings	1959 Average Weekly Hours	1959 Average Hourly Earnings	1960 Production Workers (thousands)	1960 Average Weekly Earnings	1960 Average Weekly Hours	1960 Average Hourly Earnings
Jan.	199.1	$100.28	41.1	$2.45	208.0	$102.16	40.7	$2.51
Feb.	198.8	101.09	41.6	2.44	207.5	99.85	40.1	2.49
Mar.	201.5	103.74	42.0	2.43	205.9	....	...	...
Apr.	176.0	101.57	41.8	2.47	...	....	...	...
May	171.8	101.46	42.1	2.43	...	....	...	...
June	196.1	98.74	40.3	2.45	...	....	...	...
July	203.4	107.10	42.5	2.52	...	....	...	...
Aug.	203.8	105.53	42.3	2.49	...	....	...	...
Sept.	212.4	102.01	41.3	2.47	...	....	...	...
Oct.	212.3	101.18	40.8	2.48	...	....	...	...
Nov.	209.1	97.66	39.7	2.46	..	....	...	...
Dec.	208.0	101.59	40.8	2.49	...	....	...	...
Tires and Tubes								
Jan.	76.9	117.55	41.1	2.87	77.9	119.80	40.2	2.98
Feb.	76.2	118.98	41.6	2.86	76.1	118.10	39.9	2.96
Mar.	77.9	122.96	42.4	2.86	...	.....	...	...
Apr.	66.0	123.98	42.9	2.90	...	.....	...	...
May	52.2	126.13	42.9	2.89	...	.....	...	...
June	70.7	108.93	36.8	2.96	...	.....	...	...
July	79.7	128.74	43.2	2.98	...	.....	...	...
Aug.	78.4	127.74	43.3	2.95	...	.....	...	...
Sept.	80.5	117.56	40.4	2.91	...	.....	...	...
Oct.	79.7	117.49	40.1	2.93	...	.....	...	...
Nov.	79.0	112.62	38.7	2.91	...	.....	...	...
Dec.	78.1	118.59	40.5	2.94	...	.....	...	...
Rubber Footwear								
Jan.	17.1	78.20	39.9	1.96	19.0	79.40	39.5	2.01
Feb.	17.1	80.59	40.7	1.96	19.1	76.23	38.5	1.98
Mar.	17.4	79.79	40.3	1.98	...	....	...	...
Apr.	12.9	73.05	39.7	1.98	...	....	...	...
May	17.7	79.58	40.6	1.84	...	....	...	...
June	18.2	81.58	41.2	1.98	...	....	...	...
July	18.3	78.60	40.1	1.96	...	....	...	...
Aug.	18.4	79.17	40.6	1.95	...	....	...	...
Sept.	19.0	79.18	40.4	1.96	...	....	...	...
Oct.	19.1	79.40	39.9	1.99	...	....	...	...
Nov.	19.6	79.80	39.9	2.00	...	....	...	...
Dec.	19.4	80.79	39.9	2.04	...	....	...	...
All Other Rubber Products								
Jan.	105.1	91.27	41.3	2.21	111.1	93.52	41.2	2.27
Feb.	105.5	91.96	41.8	2.21	112.3	91.76	40.6	2.26
Mar.	106.2	93.02	41.9	2.20	...	....	...	...
Apr.	97.1	90.03	41.3	2.22	...	....	...	...
May	101.9	92.18	41.9	2.18	...	....	...	...
June	107.2	94.98	42.4	2.24	...	....	...	...
July	105.4	95.40	42.4	2.25	...	....	...	...
Aug.	107.0	93.21	41.8	2.23	...	....	...	...
Sept.	112.9	94.73	42.1	2.25	...	....	...	...
Oct.	113.5	93.38	41.5	2.25	...	....	...	...
Nov.	110.5	89.87	40.3	2.23	...	....	...	...
Dec.	110.5	92.93	41.2	2.25	...	....	...	...

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1953	1954	1955	1956	1957	1958	1959	1960
Jan.	33.24	34.16	35.07	35.24	34.82	36.31	35.67	33.09
Feb.	33.76	35.00	35.04	36.26	34.82	35.83	35.69	33.20
Mar.	34.10	35.23	34.33	36.70	35.35	36.05	35.71	33.54
Apr.	33.85	35.22	34.23	36.43	35.43	36.00	36.05	34.10
May	34.30	35.34	34.80	36.65	35.40	36.27	36.24	34.15
June	34.11	35.17	34.83	36.67	35.45	36.33	36.05	34.22
July	34.20	35.37	34.61	35.43	35.49	36.51	34.67	....
Aug.	33.82	35.19	34.53	34.31	35.15	36.36	33.17	....
Sept.	33.69	35.46	33.85	34.35	34.74	36.00	32.99	....
Oct.	33.53	35.24	33.93	34.45	35.09	36.23	32.77	....
Nov.	33.60	34.80	34.87	34.56	36.06	36.24	32.79	....
Dec.	33.52	35.03	34.95	34.56	36.50	35.75	33.02	....
Average for Year	33.81	35.10	34.59	35.50	35.36	36.16	34.57	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1957 = 100)

(Based on man-hours)

	1958	1959	1960		1958	1959	1960
Jan.	116	108	118	July	125	128	...
Feb.	114	113	117	Aug.	131	120	...
Mar.	116	112	115	Sept.	136	120	...
Apr.	112	104	...	Oct.	133	115	...
May	113	105	...	Nov.	141	113	...
June	125	117	...	Dec.	140	116	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1958	1959	1960		1958	1959	1960
Jan.	448	508	530	July	478	519	...
Feb.	413	490	570	Aug.	438	492	...
Mar.	396	506	510	Sept.	464	544	...
Apr.	429	543	540	Oct.	493	555	...
May	428	524	...	Nov.	472	482	...
June	445	520	...	Dec.	518	500	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1958	1959	1960		1958	1959	1960
Jan.	1,100	998	1,140	July	980	1,075	...
Feb.	1,087	1,022	1,140	Aug.	1,024	1,113	...
Mar.	1,069	1,030	1,160	Sept.	1,024	1,114	...
Apr.	1,047	1,015	1,190	Oct.	1,022	1,115	...
May	1,020	995	...	Nov.	1,018	1,120	...
June	986	1,013	...	Dec.	994	1,140	...

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¼	11½	16.36	1942	22½	22½	22.50
1922	28⅜	13⅜	17.50	1943	22½	22½	22.50
1923	37½	24¾	29.45	1944	22½	22½	22.50
1924	40⅝	17⅜	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅜	4¼	6.17	1952*	33	26½	29.15
1932	4¾	2½	3.49	1953	31⅞	19⅞	24.21
1933	9⅞	2⅞	5.96	1954	34½	19½	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅜	26⅝	31.13
1937	26⅞	14	19.39	1958	32⅝	24⅜	28.13
1938	17⅞	10¼	14.64	1959	49	29¾	36.56

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1953	1954	1955	1956	1957	1958	1959	1960
Jan.	29.40	20.22	33.92	41.70	33.32	27.15	30.34	41.18
Feb.	27.57	19.98	34.90	33.68	30.43	26.32	30.26	39.33
Mar.	26.59	20.16	31.08	33.68	31.76	26.65	31.62	40.74
Apr.	24.66	22.06	31.75	31.75	32.23	26.44	33.72	40.35
May	25.52	21.96	31.35	29.61	32.12	25.51	36.48	43.62
June	24.42	23.01	34.74	30.54	32.80	26.20	34.31	45.70
July	23.64	24.12	40.84	33.91	32.88	27.70	35.19	....
Aug.	23.06	23.00	48.85	35.69	32.13	28.72	38.43	....
Sept.	23.06	23.00	48.27	32.64	29.94	29.49	40.22	....
Oct.	20.82	26.57	43.81	32.68	29.24	31.06	41.50	....
Nov.	20.58	28.07	44.95	35.18	27.47	32.10	45.16	....
Dec.	20.92	29.88	48.40	37.01	29.25	30.28	41.46	....
Average for Year	24.21	23.61	39.16	34.24	31.13	28.13	36.56	....

Note: (*) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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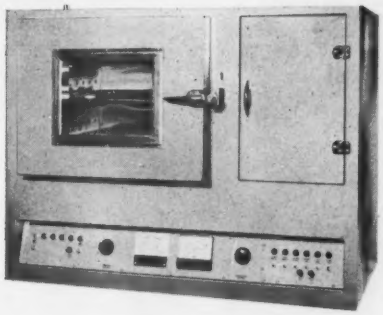

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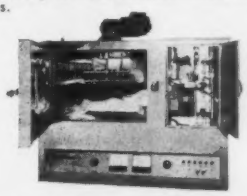

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car.	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car.	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car.	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car.	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car.	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car.	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total) ...	36,765	65,150	1,733	103,649	106,940	250,536
Passenger Car.	32,725	56,603	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1958 (total)	26,783	70,797	1,348	98,928	96,563	20,939
Passenger Car.	23,408	61,570	717	85,696	83,636	17,778
Truck and Bus	3,375	9,226	631	13,232	12,927	3,161
1959 (total)	34,163	76,812	1,430	112,405	117,875	26,933
Passenger Car..	29,746	66,797	786	97,329	102,637	23,578
Truck and Bus	4,417	10,015	644	15,076	15,238	3,355
1959:						
July (total)	3,588	6,832	112	10,532	11,223	19,877
Passenger Car.	3,188	5,988	65	9,242	9,857	16,853
Truck and Bus	340	844	47	1,290	1,366	3,023
Aug. (total)	1,249	6,595	114	7,957	9,683	21,730
Passenger Car.	973	5,721	67	6,761	8,458	18,677
Truck and Bus	276	874	46	1,196	1,225	3,054
Sept. (total)	2,345	6,819	135	9,298	10,103	22,542
Passenger Car.	1,923	5,850	77	7,850	8,804	19,636
Truck and Bus	422	969	58	1,448	1,299	2,906
Oct. (total)	2,966	7,166	136	10,269	10,884	23,151
Passenger Car.	2,628	6,015	79	8,722	9,374	20,287
Truck and Bus	338	1,151	57	1,547	1,510	2,864
Nov. (total)	1,440	4,898	120	6,458	8,347	25,133
Passenger Car..	1,252	4,161	64	5,476	7,088	21,996
Truck and Bus	189	737	56	982	1,259	3,137
Dec. (total)	3,197	4,565	180	7,942	9,645	26,933
Passenger Car..	2,912	3,826	105	6,844	8,344	23,578
Truck and Bus	285	739	75	1,099	1,301	3,355
1960:						
Jan. (total)	4,333	6,823	156	11,322	10,325	25,943
Passenger Car.	3,912	6,006	111	10,030	9,011	22,567
Truck and Bus	421	826	45	1,292	1,315	3,376
Feb. (total)	3,996	6,047	136	10,179	10,772	26,473
Passenger Car .	3,569	5,257	78	8,904	9,371	22,972
Truck and Bus	421	789	59	1,275	1,401	3,502
Mar. (total)	3,753	5,827	157	9,737	11,115	27,921
Passenger Car .	3,333	5,156	90	8,578	9,679	24,144
Truck and Bus	421	671	67	1,158	1,436	3,777
Apr. (total)	3,584	7,348	182	11,114	10,517	27,401
Passenger Car .	3,200	6,558	114	9,872	9,165	23,512
Truck and Bus	385	790	68	1,243	1,352	3,889

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,525
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1948	3,909,270	1,363,856	5,132,090	1958	4,257,812	874,278	5,132,090
1949	5,108,841	1,123,736	6,232,577	1959	5,591,243	1,134,858	6,726,101
1959:							
Jan.	539,451	96,044	635,495	July	548,524	114,687	663,211
Feb.	476,977	99,973	576,950	Aug.	255,831	60,147	315,978
Mar.	575,012	111,355	686,367	Sept.	229,410	79,573	308,983
Apr.	585,789	116,910	702,699	Oct.	537,159	94,993	632,152
May	545,001	114,995	659,996	Nov.	267,829	53,968	321,797
June	554,878	119,544	674,422	Dec.	475,382	72,669	548,051
1960:							
Jan.	676,712	115,268	791,980	July	.....	.....	.....
Feb.	656,579	125,938	782,517	Aug.	.....	.....	.....
Mar.	659,730	131,169	780,899	Sept.	.....	.....	.....
Apr.	588,046	114,590	702,636	Oct.	.....	.....	.....
May	607,191	118,023	727,214	Nov.	.....	.....	.....
June	.....	.....	.....	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	...
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	80,077
1958	2,678	37,872	870	41,420	41,266	8,602
1959	3,624	41,522	891	46,037	46,059	10,536
1959:						
Sept.	347	3,258	88	3,693	4,065	8,334
Oct.	265	3,571	79	3,915	4,391	9,088
Nov.	163	2,867	67	3,097	3,756	9,918
Dec.	240	2,793	102	3,135	3,612	10,536
1960:						
Jan.	365	4,964	62	5,391	3,899	8,924
Feb.	370	3,554	87	4,011	4,043	9,002
Mar.	365	2,807	111	3,282	4,241	10,113
Apr.	330	2,862	114	3,306	3,628	10,495

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins						All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1958	72,404	67,594	214,701	63,050	113,583	28,913	68,307	52,904	117,752	801,208
1959	85,136	125,639	304,711	64,703	151,840	31,371	94,418	57,599	159,528	1,074,945
1959:										
Oct.	8,638	12,604	30,838	4,898	14,212	2,927	8,615	5,716	13,422	101,870
Nov.	7,962	11,598	26,409	3,968	12,801	2,095	7,242	4,786	13,145	90,006
Dec.	7,360	11,923	22,604	4,151	11,482	2,443	9,886	4,705	12,215	86,769
1960:										
Jan.	8,846	10,244	21,253	5,012	12,989	2,715	8,151	4,551	12,433	86,194
Feb.	9,044	10,382	24,234	5,019	13,722	2,602	7,585	4,811	13,849	91,248
Mar.	9,106	10,294	25,663	5,127	14,718	3,171	9,510	6,149	14,652	108,390
Apr.	8,272	10,816	22,835	5,157	12,811	3,431	8,482	4,797	12,644	89,245

Source: Chemical Division, U. S. Tariff Commission.

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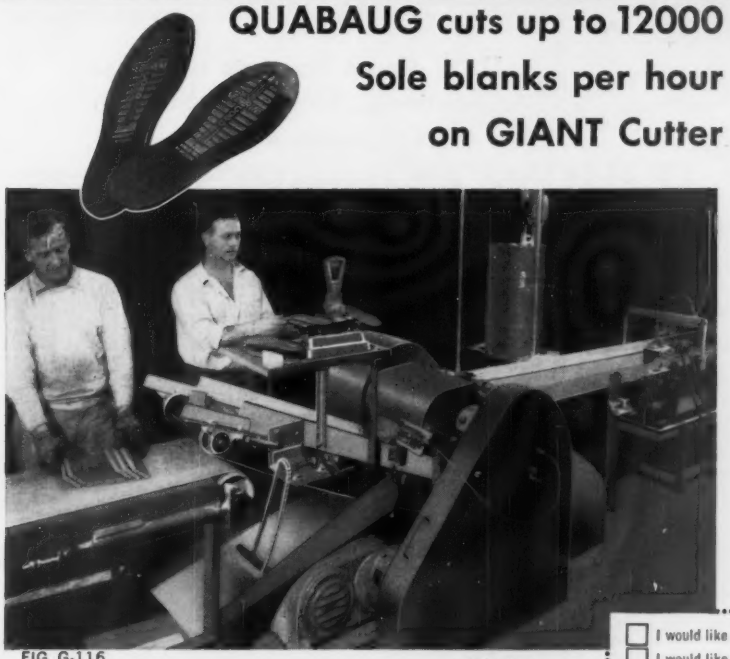

FIG. G-116

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Various Compounding Materials Consumed by the Rubber Industry

Material	1951	1952	1953	1954	1955	1956	1957
Antimony, Primary							
Short tons	19c	66c	20c	49c	78	156	284
% of total	.001	.004	.001	.004	.006	.010	.024
Asphalt: [a]							
Short tons	21,414	33,288	.....	.....	.....	.....	.....
% of total	0.3	0.4	.....	.....	.....	.....	.....
Barite (Barytes):							
Short tons	15,000	18,000	21,000	20,000	25,104	22,101	21,782
% of total	2.13	2.0	2.0	2.0	2.0	2.0	1.0
Carbon Black:							
Short tons	530,614	537,273	566,797	511,813	643,430	622,325	635,781
% of total	93.9	93.1	94.4	93.5	93.5	95.5	95.5
Clay, Kaolin:							
Short tons	231,331	240,982	241,052	247,431	257,223	268,157	301,185
% of total	12.7	13.2	12.8	13.2	11.9	12.0	14.0
Clay, Fire & Stoneware:							
Short tons	.....	9,322	18,475	8,781	2,928	.....	.....
% of total	.....	0.1	.2	.1	.2	.....	.....
Lime:							
Short tons	1,126	2,000	1,631	1,555	1,465	2,487	2,799
% of total	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Litharge:							
Short tons	2,641	2,109	2,230	1,768	1,947	2,266	1,898
% of total	1.1	1.5	1.4	1.3	1.3	1.7	1.7
Lithopone:							
Short tons	3,295	1,523	1,723	1,701	2,163	2,000e	....
% of total	3.2	2.5	3.3	3.9	5.0	5.0	....
Mica, Ground:							
Short tons	6,551	5,126	5,668	5,021	7,339	7,021	8,579
% of total	9.0	7.0	7.8	6.3	6.9	8.0	9.0
Sulfur:							
Short tons	84,000	84,000	89,600	84,000	89,600	89,600	89,600e
% of total	1.4	1.4	1.4	1.3	1.2	1.1	1.1
Talc: [b]							
Short tons	70,970	64,476	61,408	58,139	38,309	30,253	28,532
% of total	11.2	10.9	10.0	9.7	5.4	5.0	6.0
Zinc Oxide:							
Short tons	71,507	72,774	78,439	71,058	86,677	80,459	81,745
% of total	48.4	51.2	52.7	50.7	51.5	51.9	54.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber
(Including Natural and Synthetic)
(All Quantities in Long Tons)

Year	New Supply	Consumption: Tons	Consumption: % to Crude [a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007 [b]	254,820	64.6	30,405	42,532
1943	304,058 [c]	291,082	59.6	15,678	46,201
1944	260,631 [d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1950	314,008	303,733	24.1	11,740	35,708
1951	366,700	346,121	26.6	14,722	45,082
1952	274,981	280,002	22.2	11,180	30,664
1953	298,336	285,050	21.3	11,597	32,319
1954	258,101	249,049	20.2	10,232	30,746
1955	326,649	312,781	20.4	13,988	31,498
1956	287,220	270,547	18.8	13,832	34,969
1957	271,647	267,352	18.2	13,021	29,323
1958	259,809	248,156	18.2	11,362	29,063
1959	303,479	286,410	20.0	11,757	27,738
1959:					
Mar.	29,327	27,869	18.8	1,375	27,582
Apr.	21,672	22,380	18.5	1,225	25,131
May	19,441	20,496	18.1	980	23,554
June	26,169	24,998	17.9	1,054	23,448
July	27,884	23,942	16.9	1,236	25,949
Aug.	25,276	22,914	16.6	879	26,165
Sept.	28,130	25,137	17.2	937	27,384
Oct.	28,255	26,022	17.6	964	27,393
Nov.	22,525	20,217	16.1	909	28,526
Dec.	23,720	22,962	17.4	1,055	27,738
1960:					
Jan.	26,532	26,540	18.9	1,106	29,031
Feb.	27,085	25,944	18.6	1,258	28,653
Mar.	29,114	26,625	18.4	1,542	29,719

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Cotton, Rayon and Nylon Tire Fabrics
(In Thousands of Pounds)

	Production: Rayon Tire Cord Not Woven	Production: Rayon Tire Cord Woven	Production: Cotton and Nylon Cord & Fabric [a]	Production: Chafer Fabrics (all fibers)	Production: Total Tire Cord and Fabric	Stocks [b]: Cotton and Nylon Cord & Fabric	Stocks [b]: Rayon Cord and Fabric
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	30,745	6,020	80,533	11,274	26,327
July-Sept.	.....	.....	31,371	6,467	91,984	11,229	26,428
Oct.-Dec.	.....	.....	34,858	8,466	107,532	12,251	25,936
Total	8,372	56,522	122,621	28,320	372,973	46,009	112,604
1959:							
Jan.-Mar.	77,307	77,307	41,565	9,163	122,661	14,025	22,093
Apr.-June	76,265	76,265	37,102	7,699	116,965	16,811	31,094
July-Sept.	76,671	76,671	39,863	8,318	119,748	14,040	35,152
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption
(In Thousands of Barrels of 42 Gallons)

	1954	1955	1956	1957	1958	1959	1960
Jan.	89,634	96,397	100,642	109,295	107,281	114,720	111,311
Feb.	86,206	88,464	98,088	96,694	95,516	99,759	108,871
Mar.	101,549	105,684	112,412	113,166	108,914	118,995	120,497
Apr.	103,866	111,116	113,034	115,820	118,477	124,917	.....
May	104,418	115,707	123,560	124,325	125,137	127,049	.....
June	113,037	120,710	126,833	121,598	125,444	133,695	.....
July	112,231	115,653	120,708	130,251	130,903	137,141	.....
Aug.	110,223	121,816	125,847	128,808	129,925	132,875	.....
Sept.	104,706	113,379	111,574	113,567	120,389	130,264	.....
Oct.	105,607	112,558	119,204	119,334	125,097	120,858	.....
Nov.	102,393	109,212	112,113	107,705	110,587	116,056	.....
Dec.	104,258	111,034	108,096	112,691	120,305	123,587	.....
Total	1,238,346	1,321,730	1,372,116	1,393,254	1,417,975	1,479,907	.....

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.
(All Quantities in Long Tons)

Year	Balata: Tons	Balata: Value	Jelutong: Tons	Jelutong: Value	Gutta-Percha & Other Guttas: Tons	Gutta-Percha & Other Guttas: Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	949	504,065	2,196	2,624,926	417	511,055
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1958	745	536,820	1,501	1,698,840	157	224,499
1959	1,512	1,350,843	1,296	1,608,986	268	311,178
1959:						
Oct.	188	254,838	107	187,721	16	13,020
Nov.	254	204,360	27	28,997	20	20,932
Dec.	150	162,680	105	121,819	10	16,710
1960:						
Jan.	144	219,497	84	100,515	47	57,798
Feb.	37	38,260	165	143,255	12	12,855

Source: U. S. Department of Commerce.

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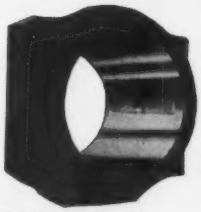

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NOTICE

The liquidation sale of real estate, machinery and equipment formerly owned by the Davidson Rubber Company of Charlestown, Massachusetts, will in no way affect the present Davidson manufacturing operation of the Davidson Company located in Dover, New Hampshire. Davidson will continue to manufacture, serve and supply all their customers in the same efficient manner as in the past..

Tuesday, July 26, 1960, at 10:30 a.m.

BANBURY MIXER: STEWART BOLLING #10 Spiral Flow Banbury Mixer, Chamber Cap. 235 lbs. Crude Rubber to 450 lbs. Soft Rubber—Installed new 1955, w/Farrel Gear Drive Unit, G.E. 350 h.p. motor.

MILLS: 2 VAUGHN 20"x22"x60"—**1 THROPP** 20"x22"x 60", 2 roll horizontal rubber mills, all have new Farrel Gear Drive Units w/125 h.p. motors, 220/440 voltage;—**2 BIRMINGHAM 1 VAUGHN** 16"x40", 2 roll horizontal rubber mills Set of 3, 16"x40" Mills run by line shaft w/Farrel Gear Drive and 150 h.p. motor.

CALENDER: Birmingham 18"x36", 4 roll vertical Calender w/Farrel Gear Drive, w/50 h.p. motor; 3 rolls available.

EXTRUDERS: NATIONAL #6 Rubber Extruder—8" cap., **2 ROYLE** #2 Rubber Extruders, 3¼" cap.—**ROYLE** #1 Rubber Extruder 2" cap.—**ALLEN** Rubber Extruder, 3" cap.

HYDRAULIC PRESSES: All are hydr. steam platen presses; high & low pressure; 2100 lbs. high, 250 lbs. low. **6 EMCO** 24"x24", 16" ram,—**5 NATIONAL ERIE** Tilt Head, 24"x26", 16" ram—**4 NATIONAL ERIE** Tilt Head 24"x26", 16" ram—**FRENCH OIL** 30"x30" Slab Press, 21" ram—**7 STEWART BOLLING** 24"x24", 16" ram—**CONSOLIDATED** 48"x48", 4" ram—**DAVIDSON** 42"x42", 22" ram—**DAVIDSON** 42"x42" 15" ram—**12 DAVIDSON** 24"x 24". Following presses are low pressure 250 lbs: **UNIVERSAL** 36"x36", 15 11/16" ram—**3 FARREL** 36"x36", 12" ram —Boomer & Boschert 36"x36", 12" ram—**WILLMAN, SEAVER, MORGAN** 36"x36", 12" ram—**DAVIDSON** 30"x30", 14" ram—**DAVIDSON** 30"x60" Sheet Press—**STEWART** 24"x24", 12" ram—**3 DAVIDSON** 24"x24", 12" ram—**2 DAVIDSON** 24"x24", 12" ram—**17 DAVIDSON** 24"x24", 12" ram.

MISC. PRESSES: GLADDER 16"x14' Electric Tilt Back Press—**DAVIDSON** 30"x60" Book Press—**DAVIDSON** 30"x60" Book Press, 1 opening w/2-8" air cylinders. All presses w/Lift Tables and Controls.

LABORATORY EQUIPMENT: FARREL Laboratory Banbury Mixer, size B, 2 ½ lb. cap., new 1953—**FARREL** 6"x12", 2 Roll horizontal sample rubber mill w/5 h.p. motor —**STEWART** and **DAVIDSON** 20"x20" and 12"x12" Hydra. Steam Platen Press—Universal 8"x8" Hydra. Electric Heated Platen Lab. Press, 4" ram—Precision Electric Ovens—Precision **"THELCO"** Elect. Oven—**YOUNGS** Gravitometer—**ANIMICO** Oscillograph—**SCOTT** Testers —Sub Zero Test Cabinet—Lightening Precumatic Mixer—**GRAM SCALES.**

RUBBER MACHINERY: BALDWIN 30" Hydra. Rubber Bale Cutter—**FALLS** 48" x 42" Roller Die Cutters* **CURTIM-HEBERT** "Lightening" 50" Buffing & Shaving Machine—2 Mch. Builders "Span" Cutter—60" and 40" Belt Knife Splitter—**THROPP** Cut Off Machine—**UTILITY** Portable 30" cutter—**7 KNIGHT** Precumatic Die Stamping Presses—**SIVON** tube vulcanizers—Rubber Stock Dryer—Despatch Gas Oven-Type **CF 32**—Wire Screen tumbling barrels — **HOFFMAN MONEL** Washer — **HUEBSCH** Dryer—**CLAWSON #2** Ice Shaving Machine—**2 INGERSOL RAND** Air Compressors, Size 9 x 9, w/40 h.p. motor.

MACHINE SHOP & FACTORY MACHINERY: SO. BEND Q.C.G. Lathe—**HANDY & PORTER** Engine Lathes—**CINCINNATI** #1½ Universal Miller—Planers—**DELTA** Radial Cut Off Saws—Bench Floor Type Drill Presses—Bench Grinders—**LINCOLN** 200 amps arc welder —**KALAMAZOO** Metal Cutting Band Saw—**FEDERAL & BLISS** Punch Presses—Do all **"ZEPHER"** Band Saw #16—Vises—Hand Tools—Pipe Fittings—Pipe—Valves—Recording instruments—8 **ELECTRIC** Chain Hoists—Motor Generator Sets—**RAYMOND** Electric Lift Truck, 3,000 lbs. cap.—**YALE "Fluid Drive"** Gas Fork Trucks, 5,200 cap.—**YALE** Gas Fork Truck, 3,000 lb. cap.—7 Hydraulic **PALLET** Trucks—80 Steel **PALLET** Racks—Steel and wood Pallets—300 Steel Clothes lockers—30 Fire Extinguishers—425 Fluorescent Light Fixtures—7 Electric Time Clocks—Tape Shooters—Stencil Machines—Toledo Dial Scales—Counting Scales—5 Exact Weight Shadowgraph Scales—**INGERSOL RAND** Pumps—**BOSTITCH** Wire Stitchers—**INMAN** Paper Box Machine—Link Belt Overhead Chain Carrier w/conveyor belts—Gravity Conveyor—Steel Work Tables—Cabinets.

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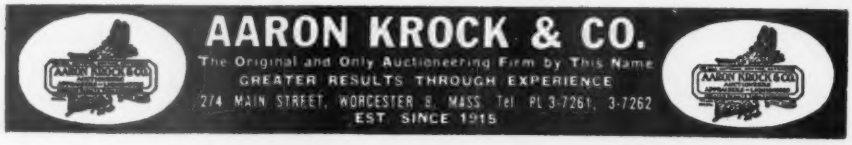
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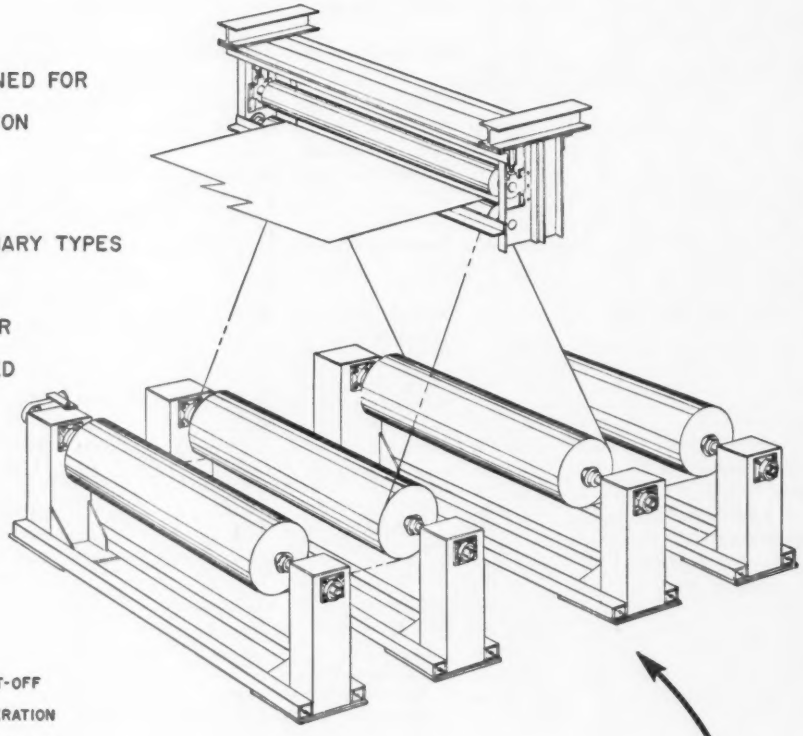

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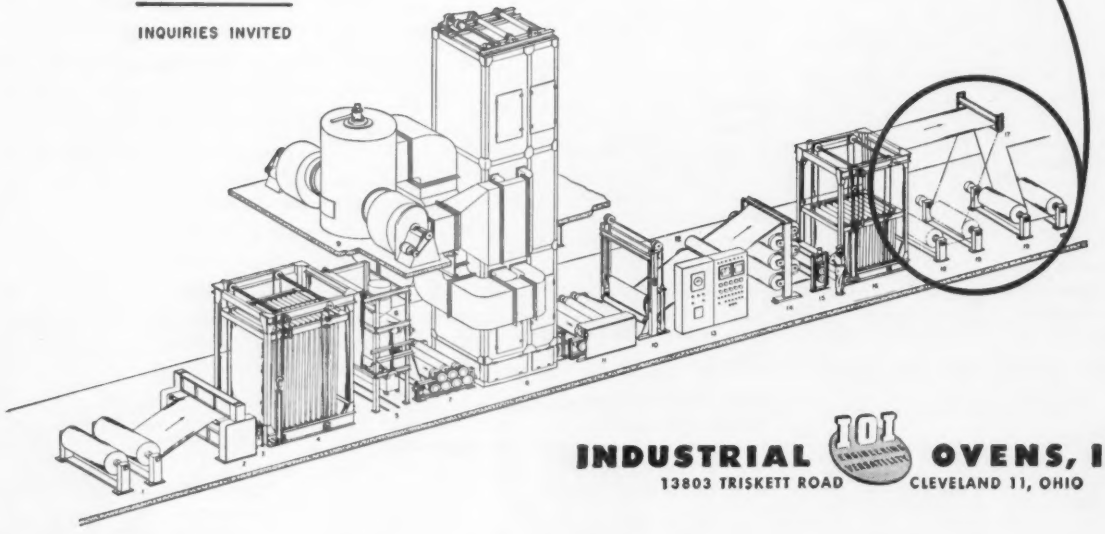

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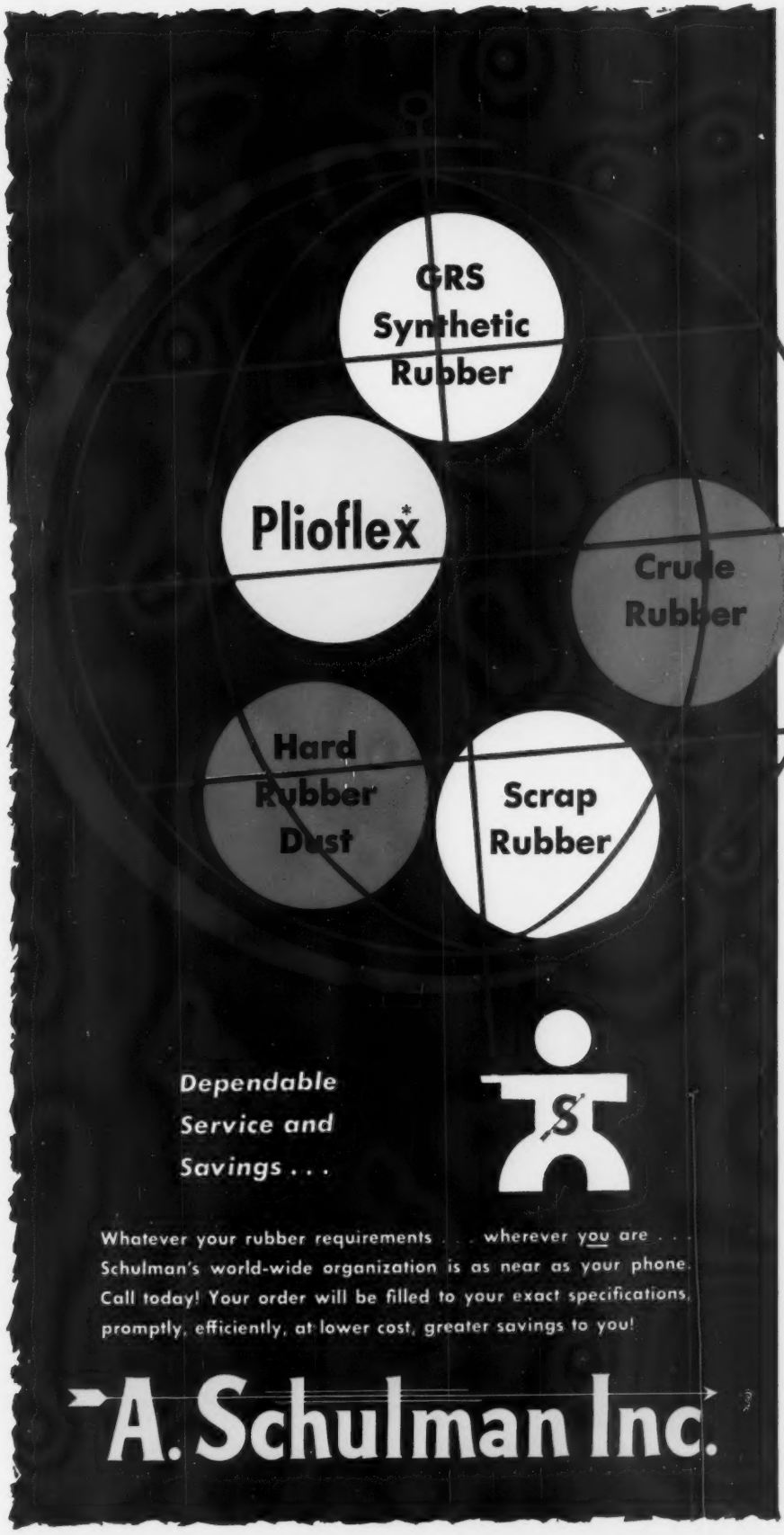

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AUGUST, 1960

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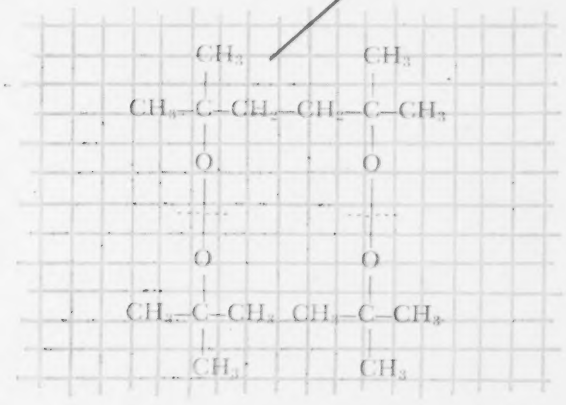

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